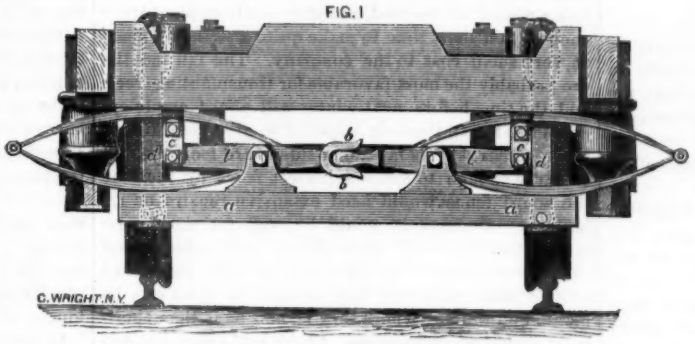
RAILROAD GAZETTE

SATURDAY, AUGUST 12, 1871.

Graham's Improvement in Passenger Car Trucks.

With the common swing truck, now in almost universal use in this country, the greater part of the weight is frequently thrown on the springs on one side by the oscillation of the car on the inequalities of the track. The springs, therefore, must be nearly twice as strong as would be requisite if the weight was equally distributed. The object of the invention of which we give an engraving beneath is to accomplish the latter purpose, *i. e.*, equalize the weight of the car in the springs. This is done by two levers, *l*, *l*, fig. 1, in the center of the swing bolster. The end of one of them is shown between the links *c*, *c*, fig. 2. The centers of these levers work in fulcrums attached to the plank *a*, *a*, and the whole is suspended to truck frames by the ordinary hangers *d*, *d*.

FIG. 1



It will be seen that when more weight rests on one side than on the other, whether caused by an unequal distribution of the passengers in the car, its centrifugal action in passing around curves, or any of the numerous causes which produce this effect, the springs which sustain the greatest weight will be compressed, the bolster will push down the end of the lever bar *l*—to which it is connected by the links *c*, *c*—thus raising both bars up at their opposite ends *p*, *p*, and thereby pulling down the end of the bolster sustaining the least weight. The links *c*, *c*, are connected at their upper ends to eye-bolts which pass through the bolster and are attached by a nut which rests on a rubber or other spring, which gives elasticity to the motion transferred from one side to the other.

As the links *c*, *c*, will hang at an angle whenever the bolsters have any lateral motion, they prevent the latter from striking the truck frame, thus obviating the necessity of springs for that purpose.

By thus distributing the weight equally on the springs, on each side, their weight and strength may be materially reduced and greater safety be secured. This arrangement has been spoken of very favorably by parties who have examined it, and it is now in operation on the Lackawanna & Bloomsburg and the Hudson River railroads. It is the invention of Mr. Charles Graham, Master Mechanic of the Lackawanna & Bloomsburg Railroad, but Messrs. Vose, Dinsmore & Co., of No. 1 Barclay street, New York, control the patent, and will give any further information concerning it.

FIG. 2

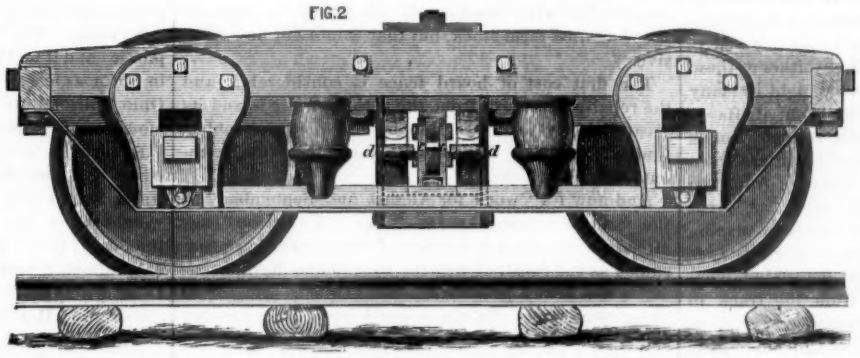
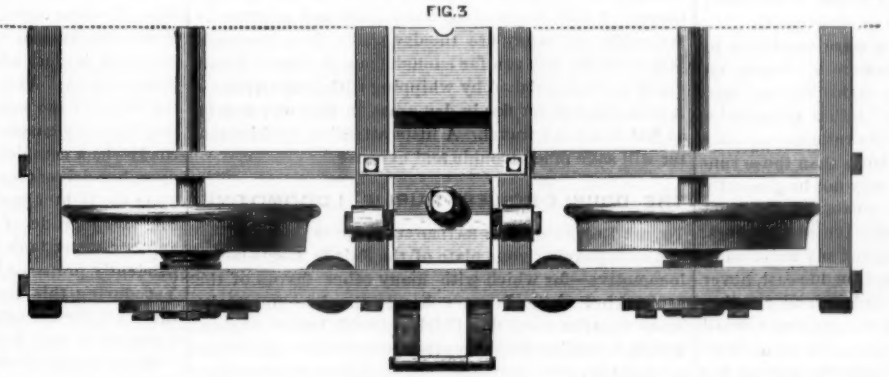


FIG. 3



The Executives of the Pennsylvania Railroad Company.

George Alfred Townsend, in a letter to the Chicago *Tribune*, from Cape May, pays his respects to President Thomson, and First Vice-President Scott, of the Pennsylvania Railroad Company in the following words, beginning with the latter:

TOM SCOTT.

A man almost shaggy in loose chop whiskers and throat hair, with a long dry-skinned face, bleached and chalky, is sitting on the porch, with a straw hat pushed back from his tolerably good forehead. He looks not unlike the late Pitt Fessenden, but without the classical severity of Fessenden's face—rather, in expression, the affable, foxy, unintense countenance of William H. Seward. A tall, long, thin man with nearly the look of an invalid; this is my first notion of Tom Scott. He talks promptly, answers questions without an instant's hesitation, nearly making one sentence with the interlocutor's, and he is as cool as an automaton.

These are said to be the substance of his reputation: dispatch, decision, coolness; the union of these qualities makes boldness or its similitude, and Tom Scott is a bold business operator, who has spent twenty years in the service of the Pennsylvania Railroad, with such progressive good fortune that its reputation and destinies are said to be his personal passion. He is intent upon its development, to the farthest limits of power and distance, and, like everything Pennsylvanian, nature had conceded to his project one-half the advantage already. This broad State stands between the East and the West, the sea and the head of the Mississippi Valley, on the line of fuel, and almost every mile of the way is rich in the freights of agriculture, manufactures and mines. It must be crossed by any approach to an American air-line from New York to the West and the Pacific. The Pennsylvania road mastered the State at an early day, controlled its successive Legislatures, purchased the repeal of all the State privileges enacted at the expense of the road, and fought competition with all the weapons of money, energy and talent. It found always its blindest ally in the city of Philadelphia, which weak sister it has used against Pittsburgh and the west of the State by the argument that the road was to make Philadelphia its terminal port and depot. Now, the game being won, Mr. Scott, for the road, means, if he can, to purchase the New Jersey lines, leave Philadelphia on a sideling as an appendage of the village of Mantua, and push for New York, meantime beguiling the Quakers with some yarn or other about a steamship line in reversion for them to Liverpool. And who can have sympathy for a city which has become the victim of its selfish perseverences in construing not only its countrymen, but even its own State folks, to be created for its use and manipulated to its market. Philadelphia, retained as a pal by Mr. Scott and others, kept back the Connellsville road fifteen years through legislative pressure, although every year cheated the western towns of the State out of hundreds of thousands of dollars in freight; and but for the same invidious influence a railway from New York to the West would have been completed several years ago, passing through the northern counties of Pennsylvania and descending the valley of the Alleghany. This road would have brought the most active intellect of the Quaker State—the Connecticut and New York elements—into correspondence with the rest of the country, but the Pennsylvania road fought Cattawissa and Connellsville alike, conceding the latter only when the courts opened the way, and Maryland was to be propitiated.

J. EDGAR THOMSON,

and this man whom I have described, the son as I am told, of a country merchant, and of the Scotch-Irish race, is believed to be the executive arm of the Pennsylvania road. The person who gets the credit for its thinking work is Mr. J. Edgar Thomson, a person as unlike Mr. Scott as it would seem to be possible. Thomson is an engineer, and a native Philadelphian, who constructed a part of the Pennsylvania road, and was then put in charge of a railroad in Georgia. He looks like an Episcopal Bishop, wears a white neck-tie, and is a robust and rather handsome specimen of the railway Turveydrop. Silence and thinking are his specialties, and he is never known to appear down in the "ring" of 'Change or politics. Like Scott, he is attendant upon the Episcopalian Church.

It is related of Thomson that, during Pierce's administration, he called at the office of the Postmaster-General to suggest a comprehensive plan of carrying the mails through the South, and he was at that time a Georgia railroad man. His card contained the name "Mr. J. E. Thomson." The servant in the ante-room reported that the Postmaster-General was too busy to see the gentleman with the unknown name. The same thing happened every day for nearly a week, and finally the Postmaster-General began to be haunted by the spectre of a very respectable person in the ante-room, wearing a white neck-tie, and never uttering a word. This respectable effigy seemed to be perfectly contented with is treatment, and merely hung on. At last the functionary said:

"Show that man in here. Let me see what is the matter with him."

The respectable man in a white neck-tie entered, and remained three hours in council with the Postmaster General. The latter came bowing him out, in the end, and said:

"Watkins, why didn't you show that gentleman in before; don't you know a great man when you see him?"

"Why," said Watkins, "that was only the Mr. Thomson who left his card every day for a week."

Thomson is still the same cautious, patient, undemonstrative being. He was elected President of the road about sixteen years ago, being taken up as a respectable compromise by the enemies of W. C. Patterson, his predecessor. After an exciting canvass, he was elected by a close vote, and in his term the railway had grown from a small affair with a single track to be the most ambitious, perhaps the most powerful, railway corporation on the globe.

Many people allege that Thomson, outdazzled by his terrible Lieutenant, Scott, never interferes with Scott's plans, but is content to be served by one greater than himself. This, if true, would be real greatness. Others say that Thomson is the statesman of the office and Scott his executive. Thomson seldom attends to any piece of detail, and when he accords an interview to anybody, merely listens. A brilliant lighting up of the eye is his sole token of response to any sentiment or suggestion. A story is told in Philadelphia that an Englishman, who wished to see Mr. Thomson on important railway business, was advised by a wag not to be loquacious, but to let Thomson do all the talking. Said this wag:

"There is nothing so repulsive to Thomson as a man who says much. He wants to occupy the whole field himself, and he is the most brilliant conversationalist in the United States."

The Englishman, therefore, presented his letter of introduction to Mr. Thomson, and said no further word. Mr. Thomson read it and merely bowed. After three minutes of perfect silence, the Englishman remarked that it was a fine day. Mr. Thomson assented that it was a desirable day. The Englishman sat serenely a few minutes and again remarked that it was to be hoped to-morrow would be as agreeable as the day which preceded it. Mr. Thomson fervently joined in this supplication. For five minutes more they regarded each other with courteous countenances, but otherwise held peace.

"What did you think of Thomson?" asked the wag, as his friend descended.

"Appears to be an idiot."

"What, Mr. Thomson, was your notion of our English friend?"

"I should judge he was a Trappist!"

SCOTT AT WORK.

Quite differently does Mr. Scott disport himself. Go into his room at Third and Willings alley, at 12 o'clock, and you will see him handing letters to a half-a-dozen secretaries, breaking their seals while he eats his lunch, and answering every letter the instant he reads it.

"No!" to the first secretary, pointing with his forefinger.

"Yes!" to the second (chewing a piece of cheese).

"Your offer accepted!" to a third.

"I do not entertain your proposition!" to a fourth.

And instantly, confidently, making up his mind and despatching work, this man, now past the middle age, flourishes the baton of the great railway.

Scott is a speculator as well as a shipper. He is rich, but not extravagantly so, with, perhaps, two millions. There are several men of nearly equal wealth in the railway, but the richest are amongst the directors and great stockholders. There is Wistar Morris, for example, a grave old Quaker manufacturer, wearing the traditional garb, and with a face cut out of silver, keen and severe; in such still, acute men of capital, you see the basis of this railroad.

The Pennsylvania Railway managers are not men of commanding genius or personality. The mediocrity of the Commonwealth embraces them, and the allegation that Thomas Scott is the ablest man in Pennsylvania might be true, and yet no great compliment. They

work together, and regard the road as greater than themselves. They are cheerful men, amazed at their own success, conscious of it, and earnest to grasp all the clues to future supremacy for it. The corporation is abler than the State, and probably despises the State in its politics and low grade of public spirit. All the work of the Pennsylvania road is well done; its track is in the best condition, and it has fewer accidents than any great line in this country.

Contributions.

EVERGREENS FOR SNOW FENCES—SNOW ON CANADIAN ROADS—HINTS ON THE PREVENTION OF DAMAGE BY FIRES.

BY WILLIAM S. HUNTINGTON.

It may be refreshing for our railroad managers in this season of heat and dust to give a few moments to the consideration of snow fences. At all events, the subject is an important one, and worthy of serious consideration at the hands of the managers of at least 30,000 miles of railroad in the United States, and of all there are in the Dominion of Canada.

But notwithstanding the fact that our Canadian neighbors experience heavier falls of snow than any save a small portion of the United States, they do not derive so great benefit from snow fences as we do, for this reason: the general direction of their main lines is in a line with all severe winter storms, and heavy cuttings are left comparatively clear of snow, while cuttings in less snowy localities but running in a different direction usually cause serious trouble and delays to trains.

Snow fences give greater protection on roads in the New England and Middle States, but there are roads in other portions of the country that may be greatly benefited by these fences, and doubtless miles of them are in course of construction and will continue to be from now until the beginning of winter. It has generally been considered necessary, in order to have a snow fence effective, to make it very *high* and very *tight*. An effective fence, however, can be built without either of these qualifications. Picket fences of ordinary hight in many places now afford ample protection from drifts at places where, before they were built, serious trouble was experienced from this cause every winter. Even the ordinary rail fence, if the right distance from the track, affords great protection from drifts. A great deal of trouble and expense might be saved by placing the ordinary rail or board fence the proper distance from the track for that purpose. To determine what distance the fence should be placed from the track in order to secure the best results, there are several things to be considered. First, the depth of the cut; and, second, the direction of the road at that point. A thick growth of small timber near the track frequently protects the road, but its effect is as likely to break the current of air just in time to lodge the snow in drifts *upon* the track as elsewhere. To locate and build a snow fence properly, one should be thoroughly acquainted with the road, for there are some peculiarities in the effect of heavy storms in certain localities. On some roads well known to the writer there are several heavy cuttings that never gave trouble from snow, while some slight excavations on the same roads give trouble every winter. If a stranger were employed to superintend the location and erection of fences on these roads, he would be likely to make serious mistakes unless he was guided by men familiar with the locality. It is well known that roads running east and west are less troubled by snow drifts than those running in any other direction, but it may not be generally known that it is far more difficult to locate and construct their snow fences so as to be effective at all times. It is usually the case—we might almost say universally—that severe storms travel in a direction due east, never varying more than a few points, and a road running nearly east and west will have curves running toward the south a few degrees. Then if the storm comes from a few points north of west it will bring the path of the storm across the track at an angle sufficient to fill the cuttings nearly as badly as if the track of the storm was at right angles to the road. A reverse of these conditions would, of course, have a similar effect; and, again, if the storm varied a few points from due west, the line of road might vary from its general direction a few degrees, and many portions of it coincide with the path of the storm, and all such portions be free from drifts.

Miles of snow fence have been built, at great expense, where it was not needed, while other portions of the road more exposed, were not provided with this protection. With these facts in view, and also the fact that snow fences are becoming more *fashionable* than formerly, it would seem to be a matter worthy the consideration of all whom it may concern.

Another matter in this connection was briefly mentioned in the Railroad Gazette several weeks since, namely: the planting of evergreens as a substitute for board fences as protections from snow.

This would seem to have many advantages over the costly board fence for that purpose. As a "snow fence" they would certainly be efficient, and as a barrier against farm stock there is no question that such a fence is stock proof. There are hardy varieties of evergreens in almost every part of the country where snow fences are needed, and any railroad company wishing to try the experiment, on either a large or small scale, can do so without patronizing nursery men. A small gang of men can be mustered without being missed on the road, and they can transplant trees enough in a short time to make quite a string of fence at very small cost to the company. The fall months are probably the most favorable for transplanting trees, and the time before next winter will afford ample opportunity for all those so disposed to give the matter a trial. Trees set this fall along side board fences would be large enough to make a perfect fence by the time the board fence would need extensive repairs or rebuilding. Perhaps it would be well for those who intend building new snow fences this season, and should conclude to try the trees, to build the board fence a little inside the line, so that the trees may be planted on the line where they should be if the experiment should prove a success. I have said *experiment*, but I hardly think that is the right term, for there is hardly room for the shadow of a doubt of the superiority of such a fence in the following points, viz.: slight expense of first cost and repairs; durability; liability to injury by fire; efficiency; appearance (which is of some importance); non-liability of injury by high winds; and, in fact, as they say of the narrow-gauge railroads, and with much more truth, "infinitely superior in every respect." An evergreen fence would probably require intermixing with some small shrubbery to make it proof against farm stock, but that would not be expensive.

The first cost of board fence is considerable, and the repairs necessary from the action of winds and its great liability to destruction by fire render it objectionable, especially if a substitute can be found without these objections.

And now for "work for August and September," as the farmers' almanac says: "The "fire season" has already commenced, and miles of fences have been consumed as the result of neglect to cut and burn, or remove the heavy growth of grass, weeds, etc., from along the track. In many portions of the country grass, etc., has ripened and become combustible, and should be removed from near the track, not only for present protection from fires, but to prevent damage from fire next spring. Such trash as is not burned or removed, but allowed to remain through the winter, is certain to take fire in the spring, always doing more or less damage. It is not an expensive operation to remove all trash of a combustible nature near the track. It may be done by cutting, piling and burning, or by burning without cutting, by standing guard while the burning is going on to keep the fire within proper limits. A half dozen men, when wind and weather is favorable, can safely fire the dry trash along the road. When the fire has run far enough from the track, it can easily be extinguished by whipping with long switches. A man can put out fire in dry grass in this way nearly as fast as he can travel. A little attention to this matter will save much trouble and expense.

THE DOUBLE-BOILER FAIRLIE LOCOMOTIVE.

To the Editor of the Railroad Gazette:

Accompanying your plate of the Fairlie single-boiler locomotive—for which with many other favors of the same kind since January hearty thanks—you make some remarks upon the Fairlie double-boiler engine, which, dissenting from, I beg leave to criticise. Americans are a quick people mentally. We are given to generalize a discussion too much, sometimes leaving out matters of prime importance, and to frequently to make a word answer for an argument. In such a position is your word "complication." As designating a large number of parts intricately put together, the word is correct enough; but the Fairlie engine is simply put together, and in practice it is not complication which is an evil, but only the effects which may and mostly do proceed from it; but not necessarily. You and I have frequently met with watches the most complex—the English lever—which had kept good time for many years with only a little cleaning and no repair, and they not in the hands of very careful people either. We have both known a careful farmer to be obliged to have his harrow repaired very frequently, say once a week or month. Now a watch is one of the most complicated of plant, and a harrow one of the most simple; yet in these two cases, the watch might have been complicated still more without great danger, while the harrow, as regards economy of repairs, would have been improved by simplification to a single tooth.

Some eighteen months ago I went to Taunton, Mass., on purpose to see the Fairlie engine built for mountain work by Messrs. William Mason & Son. Having been given by Mr. Mason every chance to note its construction and work, I speak with fair knowledge in saying that even this one, the first built by Messrs. Mason, and weighing over 60 tons, moving so softly, and yielding so easily to every inequality in the track, would cost less for repairs than the ordinary locomotive under the same circumstances. Attention need only be called to the evident fact that this quality would be much improved when the same builders put up another, and that the motion would be better on a 20 or 30-ton engine. It is the watch and harrow over again. In the one case the work is done smoothly, owing to the balance and easy movement of the parts; in the other the work tears and strains, because the parts are not properly balanced, and the motion consists of plunges and jerks and hammering. Again, a curved steam-pipe is more complex than one straight from the boiler to the cylinder, but its complexity enables it to yield to the motion, and it lasts longer with less repairs.

In this connection I may remark that Mr. Fairlie's flexible pipe was, in the first place, a pipe curved to a coil. It answered a good purpose, but he has found in practice that his patent metallic packing answers a better one economically. All through the railroad system we find the same law. The engine and train, which is the point of concentration for all railroad labor, would be less complex without the many springs which now ease their motion, and the trucks which are used for the same purpose, but would they be more economical?

As regards the cab, that may be placed almost as you please; and if on the top of the boiler with a steam-dome, in form as are the "camel-backs" of the Baltimore & Ohio Railroad, would give ample space for the accommodation of guests.

Excuse my hunting up old scores, but you said a while back that engines carrying their own wood and water would not answer because of the change of weight upon the drivers. Did you remember that the equivalent Fairlie to our 30-ton engine has only about 3 tons per wheel at most, thus saving about 2 tons per wheel pressure from the ordinary locomotive? But it seems to me that, except upon a dead-level road, this change of weight may be made an advantage. For where do we have the most trouble for a dead pull? Why, when we stop on a stiff grade for wood or water, and here the increase of weight becomes increase of power to advantage.

Now most of our roads are not level, but of the following description: We leave a stream, say; ascend a grade to a generally level plateau, pass a depot, and at the end of the plateau descend again to another stream.

It is very desirable to locate our water tanks by the side of these streams, yet inconvenient in many instances because of the grade to be surmounted ahead. Now this is just where the fault, as you regard it, becomes a gain. As a fault it is but a trifle, is far within the limits of the same fault in the ordinary engine, and may in many cases—perhaps I may say on most of our roads—be a complete gain. The engine has full weight upon her drivers upon the ascending grade, less weight upon the lighter grades of the plateau, least going down the steep grade of the other side, where she meets another water tank by the side of another stream and prudently prepares herself for the succeeding up-grade. Yet during this time we have used less weight upon the track for the same load, by far, and that weight is balanced so that it does not hammer.

No advocate of the Fairlie engine (proper) expects that the whole locomotive service of the country could be turned off at a moment's notice and "double bogies" turned in. What is advocated is a fair, honest trial, and then gradual replacement, according to requirement, with it, if approved. I think that Messrs. Wm. Mason & Son, Taunton, Mass., will build engines of this description at a price not exceeding, and perhaps less than, that of our present locomotive.

Louis Nickerson, Civil Engineer.

St. Louis, Mo.

Great Western of Canada.

The branch of this road from Harrisburg, 167 miles east of Detroit, northward through Guelph and Alma to Drayton was changed from the gauge of 5 feet 6 inches to that of 4 feet 8½ inches on the 28th ult. The length of the line is about 60 miles, and the change was made within two hours.

A Question in Train Dispatching.

Rawlins Station, U. P. R. R., Aug. 2, 1871.

To the Editor of the Railroad Gazette:

The following order was received and caused considerable controversy.

"Train No. 7, of August 2, is abandoned between Cheyenne and Bitter Creek."

Cheyenne is the east end of the dispatcher's division, and Bitter Creek the west end. Does this order affect other trains of the same number running on the division that day or only the train leaving Cheyenne on said date, and does the order hold good until such train's time is up on that division? Is it or is it not a proper order, or is there any rule governing all railroads in regard to running orders, etc.? Please reply through your paper. Yours, etc., E. P.

[In reply to your inquiry concerning the above telegraphic train order, we will say that it is the usual form in which such instructions are transmitted. The order should be applied only to the train that was to leave Cehyenne on the date given, that being the initial point for No. 7 on the division, and held good until the time was up at Bitter Creek.

The fact that the time of a train ran over into the succeeding day, or that a division is so long as to bring two trains of the same number on it at the same time, makes no difference if the number, date and starting point are well known. The public might be puzzled by such an order, but it is plain to the railroad employe. Brevity in train dispatching is desirable both to economize time in the use of the telegraph line and for trains, but where so much life and property depends upon the slightest misconstruction, it is best to be explicit. The question may be fairly raised whether in cases where the time of a train lapses into the succeeding day, or where two trains of the same number are on different parts of the division at once, it would not be better to word such orders as follows:

"Train No. 7, leaving Cheyenne at three p. m., August 2, is abandoned between Cheyenne and Bitter Creek."

This would appear to give no opportunity for ignorant or blundering persons to misinterpret the order.

Train dispatching cannot, as yet, be considered one of the exact sciences. While there are certain general rules, such as always holding the train having the right to the road before giving the opposite train the final order, nearly every dispatcher has his individual method of doing the work. There is no department of railroading where more money can be saved for the companies than by the successful handling of trains. Our correspondent has broached a subject which should be full of interest to railroad men.—Editor Railroad Gazette.]

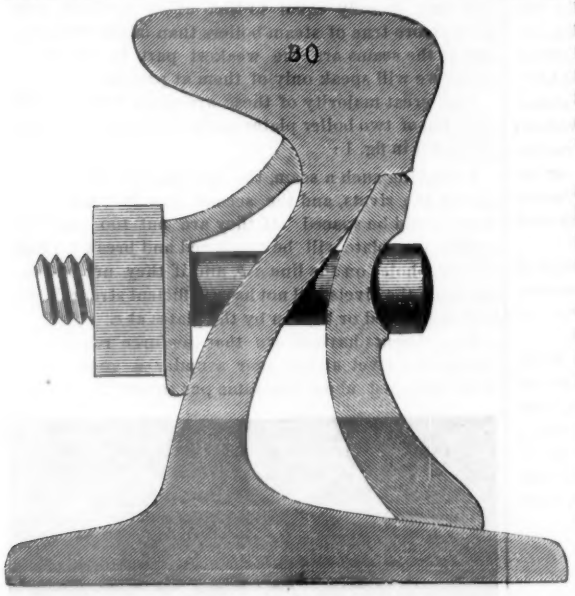
Beers' Vibratory Rail.

This rail is the invention of Mr. S. A. Beers, of Brooklyn, and is intended as a substitute for the ordinary T rail. It has been in use on the Hudson River Railroad for three years, and it is claimed by the inventor that it has important advantages, which we present in his own language:

"To facilitate an explanation of this difference, the principle represented by the T rail will be first considered:

"Any bar of iron, or any form of railroad rail, contains *three* distinct elements of strength: First, vertical, or perpendicular strength; second, lateral or transverse strength, and, third, torsion, or twisting strength. In reference to the T rail, it should be understood that but *one* of these elements, that is the vertical, is or can be used; the other two, which constitute about one-half of its ultimate strength, are undeveloped; and the metal out of which these forces are created, when placed in proper form and position, is here present only as dead weight and neutral axis; and being presented in the shape of an anvil, transversely, every blow from the wheel produces the greatest possible amount of abrasion.

"As the *direction* of the load or force cannot be changed from the vertical, the *form* of this rail is changed to an oblique resistance by making the top of the head and shank overhang the bottom of the shank or fulcrum, so that under extreme pressure, the head, and upper portion of the shank shall be deflected laterally, while the whole rail or section may or may not be subject to vertical deflection.



"By this change of form, the neutral axis of the T rail is placed under strain by transferring the fulcrum or initial point from the center, as in the T rail, to near the bottom of the shanks.

"This oblique shank then presents an overhanging spring, upon which a pressure or weight of say two tons would produce a lateral deflection of the head and a longitudinal fracture along the side and near the base of the shank; *provided* the section of rail was not more than *four inches* in length; but were it *three feet* in length, it would of course require nine times the weight, or eighteen tons, to produce the same effect.

"And if the rail was eight or ten feet in length, then would be developed the *third element*, torsion strength.

"As the head of the rail must be twisted edgewise out of alignment, at the point of contact, and for some distance each way along the rail, before any strain can reach the shank, hence it follows that any amount of strain to which the rail is subject in use is thrown upon and carried by the strength of the rail *head* laterally, or edgewise, and not on the shank, however thin.

"And as the *tendency* to *deflect* is inward, such tendency is met and neutralized by the lateral force generated and intensified by oscillation of the engine in proportion to the speed.

"This *spreading force*, which is superior to the vertical weight of the engine (when running at high speed), is met and resisted, not by the tenacity of the inside spikes, as in the T rail, but by the oblique shank forming a brace in the direction of this thrust, or last-named force.

"As a result of this combination of principles, heretofore unused, the rail becomes a compound, lateral spring of superior strength, based upon the principle of reverse and compensating curves, within which combination there remains neither neutral axis or dead weight.

"Oscillation, on the T rail, increases with the speed, and soon fixes a limit beyond which it is unsafe to run, while the effect of speed upon this spring power is reversed. As the successive blows and changing pressure from oscillation of the train are intensified by increasing speed, and thus additional service is thrown upon the rail, the spring power will be more fully developed and held under constant or continuous tension. Hence the greater the speed the steadier will be the motion of the train, so that speed will no longer be limited, as at present, by the imperfection of the track, but be dependent upon the perfection of journals and wheels.

"By this change of form and utilization of the dead weight and neutral axis of the T rail, the capacity of the vibratory rail is increased fully 30 per cent. in iron and 40 per cent. in steel; so that after reducing the weight and cost 20 per cent. in iron, and 25 in steel, we maintain an important increase of strength over the T rail of full weight, thus leaving a 50-pound rail in iron or steel amply sufficient for the heaviest class of road, and 40 pounds sufficient for any medium class, or 30 pounds for any class of narrow-gauge.

"The fish plate fastening, as applied to this rail, instead of spreading or breaking under extreme depression at the joint, presents a section of a cylinder; so that under the above pressure it presents no breaking point, like the thin lower edge of the vertical plate of the T rail, but will spring inward instead of outward, and thus place the entire surface of the wide base of the plate and the whole of the inner surface below the bolt under tensile strains: Hence liability to breakage is effectually prevented.

The outside plate is simply a continuous washer.

This fastening has but three bolts, the center bolt acting directly upon the joint.

"The length of plates is eighteen inches, and the weight from seven to ten pounds."

MECHANICS AND ENGINEERING.

Testing Steel.

The Pittsburgh *Commercial* gives a new method of testing steel, so as to insure uniform and superior quality in steel rails, now coming rapidly into general use on the railroads of the United States. By the Griswold method, a test ingot from each five ton ladleful of liquid steel is hammered into a bar and tested for malleability and hardness, and especially for toughness, by bending it double when cold. In case the test bar falls below the standard suitable for rails, all the ingots and the rails rolled from them are stamped with the number of the ladleful. To ascertain whether the rails will endure actual service on the track, a piece is cut from one rail in each charge and is tested by placing it on iron supports, one foot apart, and then dropping a weight of five tons upon the middle of it, from a height proportioned to the pattern of the rail. In case the test rail does not stand the blow deemed proper, all the rails made from that ladleful of steel are rejected for use on railroads.

Another Car Coupling.

Mr. Albert Porter, of Irving, Ill., has secured a patent for a coupling arrangement in which the ordinary form of link is used. Instead of the common pin, however, there is pivoted, in a recess in the lower lip of the draw-bar-head, a sort of tumbling hook, of the general form of a common garden hoe with a very short handle. It is pivoted at the angle and, before the coupling is effected, the pin lies horizontally, projected forward. As the link enters the mouth it strikes the vertical arm of the tumbling hook and by its pressure raises the pin to a vertical position *through the link*. When the pin has come to a vertical position it is caught and held at the top by a gravitating catch at the top of the mouth of the draw bar. The only way in which the cars may now be detached is by lifting this catch. This the inventor proposes doing by a connection to a lever either on the platform or top of the car.

The invention involves simply a change in the form of the draw-bar-head, and, as the common link is used, there is no difficulty in connecting cars with this coupling to those of the old form.

Fort Wayne Shops.

On the 9th inst., the Common Council of Fort Wayne unanimously voted that a donation of $30,000 in land and $15,000 in money be made to the Toledo, Wabash & Western Railway Company, to secure the retention of its shops there, and to aid in increasing the same to nearly double their present capacity. They also agreed to approp iate $15,000 to assist the Ft. Wayne, Muncie & Cincinnati Railroad in building its shops in Ft. Wayne.

—Dr. Gustav Kluppel, an eminent German metallurgist, has been examining the iron works of America and reporting his observations in a German technical journal. He ridicules the anxiety of American ironmasters for pure coal, feeling confident that the ordinary bituminous coal of the West as well as the East would be available for use in blast furnaces if properly coked. Of the natural advantages of St. Louis and vicinity for iron manufactories he says: "As the railroad bridge over the Mississippi, opposite St. Louis, will be completed within a year, there is nothing in the way of the iron manufacture, including the blast furnaces, settling near East St. Louis in the immediate vicinity of the coal mines. Here both coal and ore are to be had cheaper than in Westphalia, for instance; and as St. Louis, in relation to England, possesses a natural protective tariff of $8 to $9 per ton, ($4 to $5 more than the Atlantic States), it may be well affirmed that here is the soundest foundation in the country for all branches of the iron manufacture, from pig iron to Bessemer steel.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.*

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

***Engineering and Mechanics.**—Mr. M N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.*

☞ *Our Prospectus and Business Notices will be found on the last page.*

MR. NICKERSON'S LETTER.

Perhaps a railroad paper is not the place for the discussion of verbal refinements, but as our correspondent criticises our use of the word "complication," it may not be amiss for us to concede here that if we had used the word *complexity*, instead of complication, we should, perhaps, have expressed our meaning more accurately. At any rate, we could have quoted Webster's definition of complex—"involving many parts"—as explanatory of what we meant, whereas complication, he says, implies "intricate or confused blending of parts," which was not exactly our meaning when we first used the word. The latter meaning is, however, not entirely inapplicable to the Fairlie double-boiler engine.

Its complexity can be determined by a simple process of arithmetic. That a double boiler, two sets of cylinders with their connections, valve gearing and reversing apparatus, "involve more parts" than a single boiler and one pair of cylinders, we do not think can be a debatable question; and that a flexible steam pipe, an independent truck attached to the engine frame, and a reversing gear with universal joints, is a more "intricate or confused blending of parts," will perhaps not any more admit of discussion than the other.

We are not quite sure whether Mr. Nickerson intends in his letter to say that the engine under consideration is not complex or complicated, or whether these characteristics in this engine are not an evil. If the latter, then, perhaps, only experience in the use of one or more of them will be a satisfactory demonstration. As Mr. Mason has shown a great deal of enterprise in assuming the cost himself—and, we may add, a great deal of skill—in building one of these engines, we hope some of our leading railroad companies will exhibit an equal amount of progressiveness and give it a fair trial, and keep an accurate account of its cost and performance. We admit that we are incapable of "evolving from our inner consciousness" exactly what the result of such an experiment would be, and all we have said is, that "on this side of the Atlantic" what we called its "great complication" has been almost universally considered the great objection to its use. If after a reasonable amount of experience it should be found that this opinion, or rather expectation, was a mistaken one, we will be the first to withdraw and openly admit it. That this opinion is extensively held, the fact that the "Janus" is still unsold, after it has been completed about eighteen months, is probably sufficient evidence, although it by no means follows therefrom that the opinion is correct, as majorities are often wrong.

With reference to carrying the fuel and water on the driving-wheels, we will only say now that it involves principles of locomotive construction which, at first sight, do not appear, and which we will consider in a future article, contenting ourselves for the present, and replying to our correspondent, by saying that if we could locate the grades to suit the engines, his theory might do very well; but, ordinarily, engines must be built to suit *grades*. If the latter were always arranged in the proper relation and with the right proportion of ascending, level and descending line, it would be very well; but if for a hard pull a full tank of water was always required, it must be taken at the foot of the incline, which would prevent the train from having a "run at the hill," which, as every locomotive runner knows, often makes this difference, that with it he can get up, and without it he will stick fast. If the incline is a long one, and, as often happens, the steepest or crookedest part is at the latter end, then the train must be stopped for water just in the position where it is the most difficult to start again.

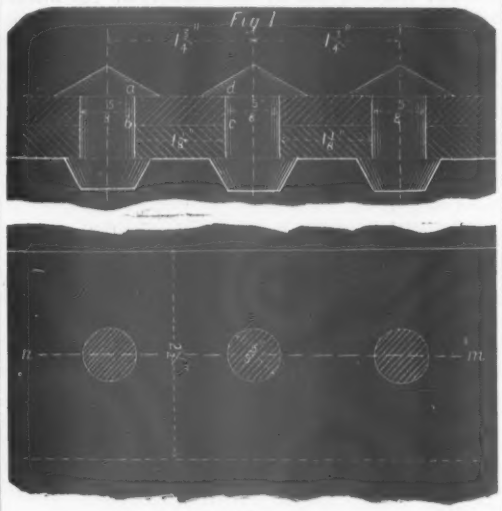
We should like very much to have an expression of opinion from locomotive runners and master mechanics with reference to this point, and they are hereby invited to tell us what they know or think about it.

One word more in reference to Mr. Mason: Mr. Nickerson certainly cannot have any higher estimation of his engineering ability, or the quality of the work done in his establishment, than we have, but we also estimate his shrewdness and business capacity too high to believe that he would build locomotives with double boilers and two sets of engines at the same price as ordinary locomotives of the same capacity.

BOILER SEAMS.

During the past week the whole country has been again horrified by the accounts of another fearful boiler explosion on one of the Staten Island ferry boats, in New York. Nearly a hundred killed, and double that number wounded, is the mournful report which the daily papers have made, and which in the telling needed not the art so often used by journalists to increase the intensity of its horror. By the side of every triumph which civilization makes over the laws of nature there seems to lurk a dark spectre of danger, which, apparently in a spirit of the bitterest revenge, at times breaks loose from all restraint and scatters pain, suffering and death with demoniacal cruelty.

Since the sad accident, there has been, of course, a perfect shout of inquiry for its cause. The answers



have been more remarkable for the confidence with which they have been given than for their wisdom. The "explosive gas," the "unequal expansion," and the "nobody to blame" theories have all been advanced. We have not seen nor heard the accident attributed to the influence of electricity, but we do not doubt many have asserted that it was produced by that cause. We believe that at least ninety-nine explosions in a hundred occur either because the boilers are too weak to stand the working steam pressure, or from the neglect of those who have the care of them. We except one in a hundred only because we cannot prove a negative.

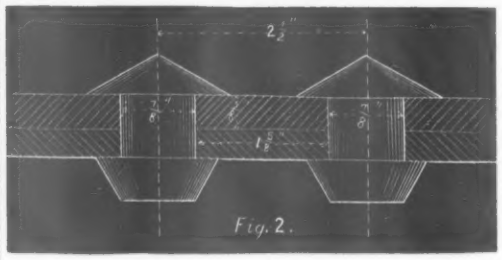
As we believe that an ounce of prevention is worth a pound of cure, and that the jury of inquest with the evidence before them will be better able to arrive at the true cause of the explosion than we could without, we shall not spend any time in speculating on the cause of the disaster, but propose to make some general observations on boiler seams, and to show the causes of their weakness and present some considerations which must be observed in their construction, in order to increase their strength. In so doing we may state what to some may appear to be facts which are rather more elementary than should be contained in an article of this kind; but in view of the dreadful calamities to which all of us are exposed by defective boiler construction, it will probably be safer to err on the side of too much explicitness, rather than run the risk of not making our meaning clear, especially to those who are most ignorant of the subject.

The old saying, that the greatest strength of any structure is only equal to that of its weakest part, seems more true of steam boilers than of anything else; and as the seams are the weakest part in nearly all cases, we will speak only of them at present.

The great majority of these are made with an ordinary lap of two boiler plates and a single row of rivets, as shown in fig. 1:

In making such a seam, the first consideration is the size of the rivets, and the second the distance, *m n*, they should be spaced. If they are put too close together the plate will be weakened and break through the rivet-holes on the line *a b*, and if they are put too far apart the rivets will not have sufficient strength, and will be sheared or broken by the plates at *c*.

Experiments have shown that the force required to shear off a rivet and to tear asunder a good boiler-plate are just about the same per square inch of sec-



tion, or, in round numbers, 50,000 pounds per square inch in each case. Therefore it would seem that the section of the plate between the rivet holes should be just equal to that of the rivets. It has been found, however, that not only has the strength of the plates been weakened by the amount of material punched out for the rivet holes, but that which is left after punching is very much deteriorated by the strain to which it has been subjected. The effects of this can be seen by examining any punched rivet hole. The material always has a peculiar granular appearance, showing that the fiber has been destroyed; and by taking a piece of boiler-plate which has been punched, planing through the center of the punched hole, and then polishing the section and applying dilute muriatic acid to it, the effect of the punch upon the fiber of the iron can be distinctly seen. Experiments made by the British Government have shown a reduction of about 30 per cent. in the strength of the metal which is left between the rivet holes of the boiler-plates after punching. Therefore, the sectional area between the rivet holes of a punched plate should be to the section of the rivet in the proportion of 100 to 70. For ⅜-inch plates, therefore, and ⅝-inch rivets—the section of the rivet being .3067 square inches—we would require a sectional area, *a*, *b*, *c*, *d*, (fig. 1) between the holes of .4331 square inches, equal to ⅜ × 1⅛. The latter should, therefore, be the distance, *d c*, between the edges of the holes. This would make the rivets 1¾ inches from center to center, which corresponds very well with ordinary practice.

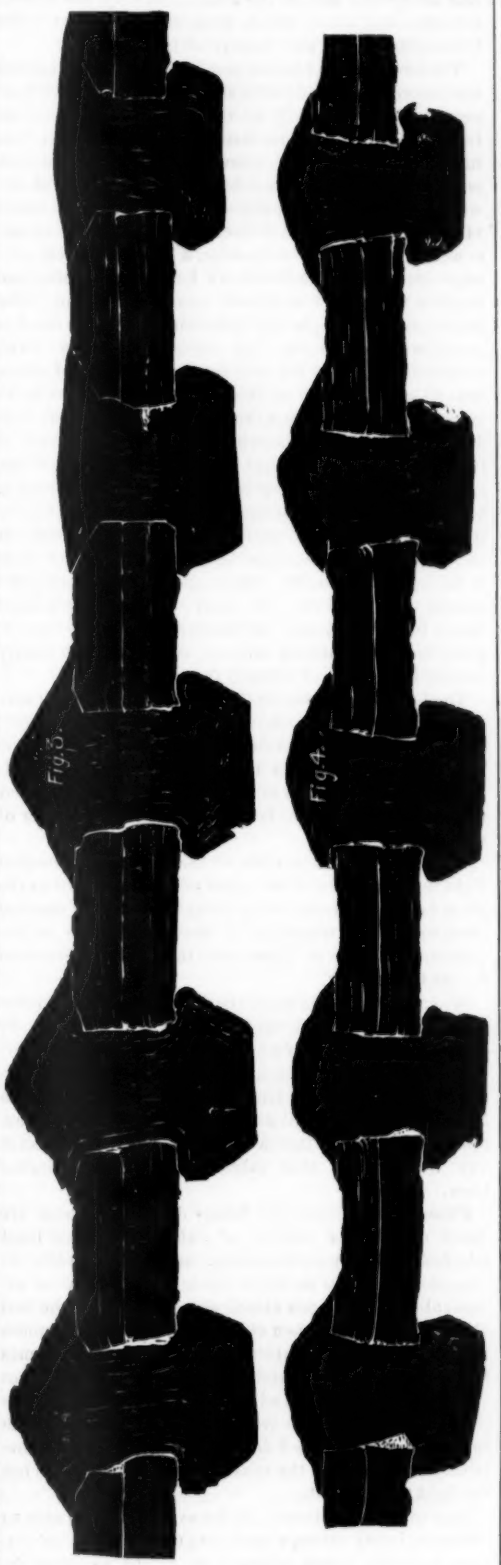
Let us see now what would be the strength of such a joint as compared with the part of the sheet which is not punched. The weakest point of the seam will be, of course, on the center line through the rivets. On this line 35 per cent. of the material has been removed by the punch, leaving 65 per cent. of the original section, which is 30 per cent. weaker than it was before the holes were made; so that the strength of the seam through the rivet holes is only 45½ per cent., that of the plate itself. In this calculation no allowance has been made for the friction of the two plates on each other, which is an uncertain and unreliable element of strength, especially with poor workmanship. Fairbairn's experiments showed that the strength of a single-riveted joint was 56 per cent. that of the plate. In tearing asunder experimental plates which were well riveted together, their friction on each other doubtless increased their strength materially; but in ordinary practice it would be very unsafe to depend upon it for the requisite strength.

Besides the mere fact of holding a boiler together,

rivets have another function to perform, which is to keep it water and steam tight. To do this they must be placed near enough to each other to hold the plates together, thus preventing them from leaking between the rivets. If the rivets do not fill the holes there is also danger of their leaking around the heads. Now, a badly fitted or crooked rivet obviously will not hold the plates together so well as one which is perfectly straight and fits in the holes accurately. Every one who has ever observed two plates which have been punched and placed together knows it is impossible to make the holes correspond with any degree of accuracy, and that they must either be strained into position by driving a drift into them, or else reamed out to get the rivets to enter. In order to show the manner in which rivets are fitted practically, we have procured two pieces of old boilers and had them planed through the center line of the rivets.* From these sections we took impressions with ordinary printers' ink and had them transferred to blocks and engraved as in figs. 3 and 4, which may therefore be relied upon as entirely accurate. The first impression on looking at them is, that the rivets have been on a spree; and yet it is probable that these are well behaved rivets, and by no means examples of the worst kind, as they were selected at random from old boilers. The engraver has endeavored to reproduce the appearance of the fiber of the iron caused by the punch passing through it. It will be seen that the metal for a space of from one to three-sixteenths of an inch around the hole has been "fatigued," or strained, so that apparently little of its strength is left. Of course, where iron is subjected to so great a strain, besides injuring its fiber there is danger of cracking it and thus creating a flaw. That many boiler explosions are due to this cause there can be little doubt. It will also be seen that the holes do not correspond with each other, and that, therefore, some of the rivets are crooked and some do not fill the holes.

Suppose now that the plates, instead of being punched, had been drilled after they had been put together so that the holes would correspond exactly, and consequently the rivets be fitted in them accurately. Obviously the plates would be held together more firmly, and, inasmuch as the strain would thus be distributed more evenly among all the rivets, both their strength to resist shearing and that of the plates to resist tensile strain would be very much increased. We will take, for example, the rivet on the left-hand side, figs. 3 and 4: they are fitted so badly into the holes that they would obviously receive very little shearing strain, and therefore it is nearly all sustained by those adjoining them. It is true that if the plates are held together there will be considerable friction between them, but this friction does not act simultaneously with the resistance to shearing, so that the force acting upon the boiler-plates would be resisted first by the one and then the other. Their total strength is, of course, less, separately, than it would be when taken together. If the rivets are fitted into the holes perfectly, the strain on the seam will be resisted equally by all of them, instead of by a portion only, and simultaneously by their power to resist shearing and also by the friction of the plates. The difference due to this cause between a punched and a drilled seam cannot, of course, be calculated accurately, as it depends upon what, to a certain extent, are accidental considerations; but that there would be a very material difference there can be little doubt. By drilling a plate, the metal which is left between the holes is very little, if at all, injured, and consequently is much stronger than that remaining after punching. By drilling plates, therefore, they, the rivets, and the seam itself, independent of them, are stronger; and as the latter will be much better fitted, they can be spaced further apart, thus leaving more metal in the plates, and, at the same time, hold them together equally well. By increasing the diameter of the rivets their transverse sectional area is increased much more rapidly than the longitudinal section of the hole they must fill, so that, to give them strength enough does not take away an equal sectional area of the plates.

Let us estimate the strength of a seam with a single row of ⅞-inch rivets, and ⅜-inch plates. The sectional area of a ⅞-inch rivet (fig. 2) is .6013 = ⅜ × 1⅝, which would be the sectional area of plate to correspond with the rivet, and 1⅝ inches would then be the distance between the edges of the rivet holes, which would make the rivets 2½ inches from center to center. As the metal between the holes has not been weakened by punching, it will have quite or very nearly all its original strength, so that the plates are weakened only to the extent of the amount of material removed from the holes. A seam of this kind would therefore have a strength of 65⅛ per cent, of the plate, instead of 45½, as it would have if the plates were punched. We are not recommending that ⅜-inch plates should be riveted with ⅞-inch rivets and placed 2½ inches from center to center; we have only made this calculation to show the difference resulting from the use of larger rivets spread farther apart. Whether a boiler could be kept



tight with the rivets so far apart is a question for practical and not theoretical solution; we are only sure of this point: that rivets, well fitted as they may be in drilled plates and cannot be in punched holes, can be spaced farther apart and keep the boiler seams equally tight, and that thus the strength of the seams is very materially increased.

We will discuss this subject still further in a future number, and will have something to say of the means required for drilling boiler plates.

* We are indebted to Messrs. Hayes and Holton of the Illinois Central, and to Mr. Boon, of the Pittsburgh, Fort Wayne & Chicago Railway, for these specimens.

"Jerk Water" on the Hudson River Railroad.

Mr. Buchanan, Master Mechanic of this road, now has the arrangement for taking up water while running —which his men have christened with the above name —attached to thirteen locomotives. The railroad company has put down four water troughs between New York and Albany, each 1,000 feet long. The fast trains on this road now stop only at Poughkeepsie, for meals and to change engines. Locomotive runners estimate that from ten to fifteen minutes are lost each time they stop to take water. As it is necessary to fill the tender three times in going over the road, by taking up a supply while running they save two stops, or from twenty to thirty minutes between New York and Albany.

By this arrangement the tanks can be filled while running at full speed, but ordinarily the engines are "slacked up" a little when water is taken, as the resistance of the water against the spout is so great when running fast that it is difficult for one man to raise it out of the trough unless the train is slowed. When running at full speed the water is taken up so rapidly that there is danger of deluging the tender and washing the coal out of it in case the spout is kept down too long.

On the last engine the spout was made only nine instead of ten inches wide, as it was found that the larger size took water more rapidly than was required.

The Hannibal & St. Joseph Railroad.

Parties from Leavenworth who recently visited Chicago for the purpose of finding what help could be had from railroad companies for new lines to and from their city profess to have discovered that the Joy party expect to lose control of the Hannibal & St. Joseph Railroad after the election in November next. It has been understood that this company is comparatively independent, and it has heretofore made some arrangements with roads east of the Mississippi which indicated that it did not care so much to give business to the "Joy roads" as to get as much as possible for itself from all sources. It has also been reported that it would not be difficult to deprive the Joy party of any considerable influence in the management of the road.

Such a change of management would be very important. The Hannibal & St. Joseph has been the chief connection between Chicago and Kansas. The Joy interest is now forwarding the construction of the Burlington & Southwestern Railroad from Burlington to St. Joseph, and this, when completed, will complete a connection with the Joy roads of Kansas and Western Missouri. If they give their business to this new route, it will pass by Burlington instead of Quncy.

Another effect of such change would be the diversion of considerable traffic to the Kansas City, St. Joseph & Council Bluffs Railroad, and, very probably, increased business from the Leavenworth, Lawrence & Galveston Railroad (now going almost entirely by way of Kansas City), by way of Leavenworth. Indeed, all the Missouri River cities north of Kansas City would be pleased by such an arrangement, which would bring the traffic of two important railroads through Southern Kansas through if not to them.

The length of the line from Burlington to St. Joseph, if it is located on a pretty direct line from Moulton, Iowa, to St. Joseph, will be about 245 miles, which will make the distance from Chicago to St. Joseph about 450 miles, which is 30 miles less than the distance by way of Quincy. To Kansas City the distance by way of Burlington would be 520 miles—30 miles further than by the present route. To Leavenworth and Atchinson the difference would be the same as to St. Joseph.

The Westinghouse Brake.

The detailed engravings of this very popular and successful brake, which we promised our readers some time ago, have been somewhat delayed, but will probably be ready within two weeks.

NEW PUBLICATIONS.

Rand, McNally & Co.'s Railway Guide.—The second number of this publication, for the month of August, is out in good time and shape, with the word "Western", which formed a part of the title of the first number, dropped. The character of the work, however, remains unchanged. The descriptions of stations have in some cases been lengthened by lists of business houses, and a handsome engraving of Niagara Falls serves as a frontispiece and an advertisement at once. In giving the population of stations, more deference often seems to have been paid to the pride of the residents than to United States census, and the round figures which are so frequently given generally exceed the number reported in the census returns. The excellence of the general plan of the work and its careful execution, which we remarked in noticing the first number, merit the success which this guide is attaining.

Van Nostrand's Eclectic Engineering Magazine. — The August number of this magazine has the following articles: The Mont Cenis Tunnel, (Illustrated); The Usefulness of Earthquakes; Computation of Effect of Gradients; On the Horse-Power of Steam Engines and Boilers, and some Facts connected with the Expansion of Steam, (Illustrated); The Pollution of Rivers; The Progress of Iron and Steel Industries

of Foreign Countries; Examples of the Performance of the Electro-Magnetic Engines; Wet Steam; Historical Sketch of the Canals of Canada; The Place Vendome Column; Engineering Matters in Turkey; Metallic Cartridge-cases; On the Architectural Treatment of Portland Cement; Explosive Compounds—especially Dynamite Nitro-Glycerine; Animal Mechanics, (Illustrated); The St. Charles Bridge, (Illustrated); Non-conducting Steam Cylinders; On some Forms of Galvanic Battery; Why the Bite of a Road Driving-wheel is Increased by an Elastic Tire, (Illustrated); Russian Railways; Condensation in Steam Cylinders; Mechanical Tests; Notes on Lime, Mortar, and Cement; The General Oceanic Circulation; Paragraphs—Iron and Steel Notes, Railway Notes, Ordnance and Naval Notes, Engineering Structures, New Books, Miscellaneous.

The Railroad Commissioners and the Railroad Delegates.

The following correspondence has passed between the Railroad Commissioners and the delegates of the several railroads who visited Springfield, last week, to confer with the Commissioners:

To Hon. Gustavus Kœrner, Chairman of Board of Railroad and Warehouse Commissioners:

Dear Sir: In regard to the information requested by your honorable body in respect to the gross earnings, etc., of the different railroad companies represented by us, we beg leave to state that, while those companies do not recognize the validity of the law under which your honorable board was appointed, so far as it attempts to impose upon the companies additional duties and obligations, yet we are willing to furnish such information as the mode of doing our business makes reasonable and practicable.

Owing to the difficulties in bringing up the accounts of the railroad companies to so recent a date as July 1, 1871, we cannot give the gross earnings for the year ending on that day, but shall cheerfully furnish you with the full annual reports of the companies represented by us to the end of their respective fiscal years. The difficulties referred to we have explained at length to your honorable body to day.

We conclude, from our interview, that it is deemed mutually desirable to speedily test the questions arising under the recent laws of Illinois in regard to the right of the Legislature to regulate freight and passenger tariffs. To that end we would suggest that such steps be taken as will, as soon as may be, cause a determination of these important questions in a court of last resort, defining the relative rights and duties of the State and railroad corporations.

Yours, respectfully,
Wirt Dexter,
For Chicago, Burlington & Quincy Railroad Company.
George C. Campbell,
For Chicago, Rock Island & Pacific Railroad Company.
J. H. Howe,
Gen'l Manager Chicago & Northwestern Railroad Company.
C. Beckwith,
For Chicago & Alton Railroad Company.

Springfield, August 1, 1871.

This communication was answered by mail as follows:

Office of Commissioners of Railroads and Warehouses, Springfield, Ill., Aug. 3, 1871.

Mr. C. Beckwith and others:

Gentlemen: In reply to your communication of August 1, 1871, we desire to state: The law in regard to the transportation of passengers, approved April, 1871, went into force July 1, 1871. The second section requires a classification of all railroads in the State according to the gross amount of their respective annual earnings per mile. The law not having fixed any particular time for such classification, the rule is that it has to be made within a reasonable length of time after the law takes effect. In our circular of the 13th of July last, we requested you to give, by way of preliminary report, a statement of the amount of gross earnings and length of your respective roads and branches by the 1st of August, said gross earnings to be returned for the year commencing the 1st of July, 1870, and ending the 1st of July, 1871.

The companies you represent not having furnished the said statement, you have assigned as a reason the difficulties in bringing up the accounts of railroad companies to so recent a date as July 1, 1871. While we duly appreciate the difficulty, it is well understood from the customary returns of gross earnings made to railroad companies by their officers and employes, an approximation amounting nearly to accuracy may be obtained. You will find no difficulty in complying with our request, and furnishing the most accurate return possible within a very short time, so that you may be enabled to classify your roads in conformity with the fourth section of the before-mentioned act. Some companies have already reported, showing that there is no insuperable difficulty in preparing such statements, and, should we not, before the 1st of September next, receive them from all the companies, we must resort to the very ample means given us in the law to obtain the desired information, and proceed to make the necessary classifications ourselves.

The desire expressed in your communication to speedily test the questions arising under the recent laws of Illinois, in regard to the right of the Legislature to regulate freight and passenger tariffs, is duly appreciated. If, by a non-compliance with the law as regards the charges for the transportation of passengers or freights, any individual citizen feels himself aggrieved, and should resort for his redress to the actions specially given him by the law, we should use every proper means to assist in bringing such a controversy to a speedy conclusion; or, should we receive, in our official capacity, reliable evidence that the laws applicable to railroad companies are willfully violated, we shall regard it as our duty to bring such alleged violation at once to the knowledge of the proper legal officer, in order to proceed against companies so disregarding the laws

In case of any non-compliance with the provisions of the law relating to the transportation of freights, we shall instruct such officers to proceed under the fifth section of said law, which provides for a forfeiture of the franchises in case of any willful violation of the provisions of said law. Our official action in the last-mentioned cases shall be performed with a special view to securing a prompt decision in our appellate tribunals, the interests of the people demanding a speedy solution of the questions which you seem desirous to submit to the final disposition of the courts.

We take this opportunity of expressing the great satisfaction we have derived from a personal interview with gentlemen representing, as you do, vast and important business interests, and possessing such a perfect knowledge of the matter under consideration. Yours respectfully,

Gustavus Kœrner,
Richard P. Morgan, Jr.,
David S. Hammond,
Commissioners.

Contributions.

AN AMERICAN ENGINEER IN ENGLAND.

Station Fixtures—Lighting Stations—Train Buffers—Platforms—Turn-Tables—Fuel and Water Supplies.

Many of those things that may be called station fixtures, since they form no part of the station buildings and hardly any part of the permanent way, are worthy of notice, and some, which have no counterpart in the United States, are well worthy of imitation.

The best platform lamps that I have seen, for lighting the immediate vicinity of a station, are those which appear to be used chiefly at the newest stations of the London & Northwestern Railway, although it is true that they may be in use elsewhere as well. The chief point of excellence in these is the plain lantern or shade, which is blown in one piece—and the largest are about 14 inches diameter and 20 inches high. The lower end is nearly closed in the blowing, a hole being left only large enough to admit a man's hand for cleaning and to allow the most convenient means of lighting. The upper part of the glass is cylindrical, and it is fixed in a somewhat ornamental top piece of a conical form. In this cone-shaped top are set small pieces of glass, bent to suit the form of the top piece; but these serve no really useful purpose, and might well be left out. The gas pipe projects downward in the inside only of the lantern, and at the end of this pipe are placed the burners, from one to three in number, as may be needed. It will thus be seen that the flame is enclosed only by the glass, that there is nothing to obstruct the light in any way, and that the ease of keeping the globe clean is the greatest possible. These glass lanterns are quite similar to those in use in many cities in the United States for street lamps, but they are even more convenient for use in railway stations, since they can nearly always be suspended entirely from above.

The lamps next best to these, to my mind, are those placed in nearly or quite all the stations of the underground or Metropolitan railways. These have a spherical lantern, 20 inches in diameter, made with a metallic frame, and the glass of which the globe is composed is in twelve pieces, and is bent to suit the diameter of the globe.

The frame is ⅛ inch wide, so that no great amount of light is intercepted by the parts of the frame, but as the glass in such lanterns is not always as carefully cleaned close up to these frames as it should be, there is frequently some loss of light more than that intercepted by the frame itself.

When made in this way the lanterns plainly have this advantage, that in the event of an accident to them only one piece of glass, or, at most, two or three, would probably be broken. The chance, however, appears to be that a lamp fitted with a thick lantern blown in one piece will never suffer to any serious extent from accidents that would not equally demolish any frame lamp that might be struck by a similar blow.

From these quite perfect lamps downward there are many of various degrees of excellence, those least adapted to their purpose being, as would readily be supposed, the ones in which the highest degree of ornamentation has been aimed at, regardless of the real utility of the lamp when complete. The most common ornamental form of lantern is made with wide frames for holding the glass; and when the whole globe is but 15 inches in diameter, and there are three complete vertical circles of metallic frame running around it, with top and bottom pieces 4 inches in diameter, and a horizontal band around the center, there is little room left for light to shine out.

In a very few instances, so far as I have been able to discover, is any attempt made to put the name of stations upon the lamps, where they would so often be most plainly seen by day as well as by night. Some of these names are in black upon a white ground, the only trouble being that, when placed upon a small globe, the name, if of more than three or four letters, runs round quite out of sight, and hence, to a stranger, is often unintelligible. The latest attempt of the kind that I have seen is near Manchester, where the station names have been printed in black upon white paper, and the paper has been pasted upon the glass of the lantern.

In nearly every important station, and in some small ones, too, a clock is put up, which is the standard for that station, and which is generally placed on the side of the building at a convenient height (from 8 to 12 feet) above the platform. Sometimes the clock is placed with two dials at right angles to the building, so that it can be readily seen at a distance from either side, and occasionally at a less angle. Usually, in important stations, the clock is illuminated, but it is sometimes lighted by a gas jet placed in front of it, the gas jet being shaded from the eyes of one looking toward the clock.

At many important way stations, and at all terminal stations, there are sign-boards placed along the platform, or at the end, showing the destination of this or that train, four or five stations being named upon them sometimes. These signs are frequently placed upon a post fixed upon a little wagon or truck, which can be moved from place to place along the platform as may be required, and is commonly made in the form of a rack, in which several of the signs can be conveniently kept ready for use. In one or two stations that I have seen these sign-posts are fixed, and there may sometimes be seen upon them four or five signs, each pointing toward a track occupied from time to time by a train.

A bell is frequently rung by a porter on the platform three minutes before the starting of the train, but the three minutes is likely to be a very variable quantity, ranging between the full three minutes before the starting and a few seconds after it. This bell, in a very few cases, is fixed upon standards with a yoke, etc., but it is more commonly a large hand bell.

Many of the platforms are made, as I have already explained, of stone slabs, and also of plank, but there are one or two others that deserve mention. Those which I have seen most recently have a heavy stone curb next to the rails, the stones being about two feet square and eight inches thick, and the platform is laid with large, dark colored, hard-burned brick, having grooves in their surface. These brick are about 5 by 9 inches by 3 inches thick, and the grooves are rounded at the bottom and are 5-16 inches wide by 3-16 inches deep, and form acute diamonds about 1½ inches on each side.

Another plan, that seems to have been recently adopted, is to make a sort of tar concrete, using, at least for the surface, a rather coarse, angular, and very white gravel, so that the light mottled tint thus produced is quite agreeable to the eye. Some of the tar concrete used in the past for such purposes, however, has cracked and gone entirely to decay. At the smaller stations the platforms are most frequently made of common gravel, carefully rammed, and afterwards swept and raked as required, the usual stone curb being placed next to the track.

The entire space between the lines of rail, at terminal stations, is usually paved, most frequently with brick, so that it can be easily and perfectly kept clean by sweeping and washing. At frequent intervals, too, in such cases, small openings with gratings are made, leading into a system of drain-pipes underneath, and the paving is so inclined as to favor the escape of water through these gratings.

As some stations through which trains frequently pass, even while other trains may be waiting on side-tracks, bridges have been erected, by which passengers are expected to cross from one side of the station to the other, when, for any reason, it happens to be necessary, and these bridges are unquestionably at times an absolute necessity; but in many cases experience at the stations has shown that the use of the bridge for this purpose entailed a needless burden and trouble both upon passengers and upon the porters, who are often required to transfer luggage from side to side. In several instances, however, a short incline has afterwards been made, leading down from the train platform, of the usual height, to a walk that is either paved or laid with plank at the rail level, and across which access is had to the other side of the station. In most cases of this kind the bridge is now very little used, and only in case one or more of the tracks are occupied by a long train that has been compelled to stop upon the walk. The passenger trains are always required to run past the walk before stopping. The inclines leading to these walks are made by simply lowering the edge of the platform to the rail level, for a distance of five or six feet, according to the width of the walk required, and the surface of the platform slopes all around to suit; and the stone, brick, or gravel material of the platform is laid accordingly. In stations where porters are likely to be compelled to cross from side to side to attend trains, but where passengers would never cross, there will be set in the wall supporting or forming the front edge of the platform two or three bricks or pieces of stone projecting far enough to form convenient steps. These are needed, because often the platforms are from 2 feet 3 inches to 2 feet 9 inches high above the rails. The ends of the platforms at all the stations terminate in an incline, so that no abrupt stepping-off place is left to endanger any one, and the picket fence, which often encloses the station platform at places in the country, is usually built so as to prevent any exit except by the gate specially provided.

The buffers or stops that are placed at the end of every side track which is not switched back into the main track, or, to use the American term, at the end of every blind switch, are of all sorts, and, as would be expected, they effect their purpose with various degrees of success. The simplest thing that can be imagined for the purpose is plainly a pile of earth, and this means is frequently used without any addition whatever. The next thing is to put up a frame of square timber, against which the end of the wagon or carriage may strike, the earth being piled against this frame as compactly as possible. The next step is the enclosing of the pile of earth within a sort of box, which is made occasionally of plank, but more commonly of old ties placed on end and bound around with old rails, or by a bar of flat iron spiked around their upper ends, the ties in each case being firmly set in the ground before the earth is piled up in the box-like enclosure thus formed. At one of the important coal-shipping stations I have seen a whole series of eight or ten side-tracks guarded in this way, the earth bank being continuous from side to side of the whole series of tracks. For such a purpose a bank of earth answers excellently, as there can generally be found room to pile up a bank so big that it cannot be pushed back, and high enough to prevent wagons from being pushed over it; but in the immediate vicinity of station buildings the earth-buffer has generally been either perfectly wrecked with its envelope or stockade of old ties, or else it appears so much shaken as to be on the point of going to pieces. In a few instances, where one of these buffers must be placed close against a station building, and therefore it becomes important to make it absolutely solid and permanent, the whole mass is built of stone, laid carefully in cement and faced with suitable timbers to receive the thrust of any wagons pushed against it. When built of stone, the whole mass would be found to be about 10 by 8 feet, by 4 feet 6 inches high. The most recent, and certainly the most substantial, fixtures for this purpose that I have seen are in the Lime Station at Liverpool and the Euston Station in London, both of which belong to the Northwestern Company. At the former place the most effective possible arrangement that can be devised is plainly required, since the station is at the foot of a grade a mile or more long, which descends, I think, at the rate of more than 50 feet to the mile. Immediately opposite the end of the tracks in the station, and closely adjoining the plattorm, is the magnificent new hotel of this company, and, hence, if any wagons or carriages got loose on this grade, and came without meeting any other carriages in the station (an unlikely thing, however,) against these buffers, and these failed to stop them, the chance would be that very serious damage would result to the hotel. Of this particular form of buffer I will try to send you a sketch shortly.

At some other places I have seen a timber frame-work, in which a sliding cross-beam was so placed that the carriage buffers when striking it should press it back against springs placed behind it, and held by other parts of the framing. These fixed springs I have found both of the volute or coiled variety and of the large elliptical form; but in the ordinary requirements of station service such fixed springs seem hardly needed, since the end buffers with springs are so universally employed upon the carriages, vans, and wagons of all kinds that come into a passenger station. In a very few instances I have seen the common chair which is used with the double-headed rail simply turned upside down and placed for a stop upon the top of the rail, being held only by the usual wooden key. Sometimes the rails laid at the end of a siding have their ends turned up, and they are held only by the chairs by which they are fixed to the ties, or by a frame either of timber or a of short pieces of rails made for the purpose, so that the wheels of wagons will strike against these upturned ends, and the wagons will thereby be kept from going off the end of the track.

I have also seen, once or twice, a stick of timber, 12 or 14 inches square, laid across the track, directly upon the rails, and held with oblique straps of flat iron passing over the top of the stick by bolts passing through the web of the rails.

One of the means a good deal used to prevent the possibility of wagons being accidentally pushed or moved from a siding or side track, on which they may have been left, is a blind switch, with a very short bit of track which, by a weight suitably attached to the lever, is kept constantly open, so as to run any wagon off at the end of the siding upon this short bit of track instead of the main track itself. The blind switch is placed, as will no doubt be readily understood, just as near the main track as possible, but still so as always to leave room for passing upon the main track without interference. The short bit of track, generally not more than two or three feet long, is left without any guard or stop at the end, so that if by any chance, as by the wind or otherwise, wagons were pushed along over it, the first pair of wheels at least would drop off the rails upon the ballast, and the wagon itself would then constitute a buffer that would effectually prevent any thing from getting upon the main track, unless it were violently pushed along, and this is precisely the thing aimed at in the use of this device. When it is required that wagons should pass from the siding upon the main track, this blind switch must be closed and held while the wagons are passing; but when the wagons travel on to the siding from the main line the switch can be passed without attention, and by means of the weight attached to the lever it is always left open toward this short bit of track. Of the peculiar character of the switches themselves I shall try to say more at another time. A more common means of guarding or closing a side track is that which is somewhat used in the United States, and which ought to be provided for every side-track, where cars are left over night or for any longer time, as for unloading or when waiting for a train. This consists of a block or beam of wood two or three feet long, which, being held somewhat loosely by a bolt at one end, can be swung round so as to lie across the rail, the other end of the block coming against a similar piece that is spiked to the ties. These are sometimes fitted with a lock so that they can be perfectly secured from interference.

For the sake of greater convenience in loading or arranging trucks or wagons at stations, turn-tables are used everywhere, even at many insignificant stations. They are used to shift wagons from one track to another parallel to it and either close at one side or perhaps outside of the building, and, frequently for the purpose of rendering available by short tracks radiating from them some comparatively inaccessible corner or point of a station yard that could not be well reached from a switch in any way. Frequently, too, there are short bays with tracks radiating from one of these tables, and the ground by the side of these tracks is brought up to the usual level of a wagon floor, so that one of the huge furniture vans, already described, can be readily placed upon a wagon, and so that any heavy casks or similar articles can be easily loaded. These tables may be always turned by hand, that is, by men pushing around on the corner of a wagon that may be upon the table at the moment, although sometimes if a horse is used for hauling the wagons about the station yard and on to the turn-table he will be made to pull the table around with the wagon on it. Although turn-tables are very much used for arranging "goods wagons," or "freight cars," as we call them, either for convenient loading or in the trains, it appears that they are quite going out of use for making up passenger trains at some of the stations where they have been laid down and have been used in years past. This is a question both of space and of frequency of trains, which might interfere with the use of the tables after a trial, even though they had been used at first with advantage.

The supply of fuel and water to the engines must be provided for at many stations, but the water cranes are much more numerous than the fuel stations. In the large towns, where space is so limited, the attempt rarely seems to be made to keep any large amount of fuel in stock, and sometimes not more than 40 or 50 tons will be found even at a terminal station from which many scores of trains depart in a day. It will be readily understood, however, that many of these trains run for short distances only, and that the quantity of fuel required for them is but small, and also that the engines hauling the heavier trains and running over greater distances are supplied at coaling stations in the country. The general plan here seems to be that each engine shall always have with it a considerable reserve of fuel, and it is by no means uncommon to see the lumps of coal piled very high on an engine that never goes more than a very few miles away from its source of supply. At some terminal stations two or three coal wagons will be found standing upon a side track, as close as may be to the main line upon which the trains pass, sometimes with only a platform five or six feet wide between, and on these platforms baskets are placed large enough to hold as much as two men can conveniently lift, and they are kept filled from the wagons, in readiness for any engine that may require fuel. These wagons are replaced day by day as they become emptied, and in such cases no attempt is made to keep in stock more at any one time than three or four wagons will hold, and, hence, no storage room is required, except for these wagons upon the side track. At some of the principal coaling stations light cranes are erected, in a building of convenient size, by which little iron wagons, holding from one-fourth to one-third of a ton each, are swung over the tender of an engine standing on the side of the building, so that the coal can easily be dropped from them into the tender. The wagons are run upon their own wheels to any part of the building to be filled. In other instances, a narrow platform, fixed quite like half of an old style draw-bridge, with a balance weight, is placed in the side of the coal shed, and upon this, when it is lowered, suitable wagons filled with coal are run out directly over the center of the tender, and from them the coal is then readily supplied. Water is generally supplied from tanks placed by the side of the track, and carried either upon columns or by walls of stone or brick. These tanks are rectangular in form, are rarely made of anything but iron, either cast or wrought, and vary in size from 6 by 10 feet, by 3 feet deep, up to 20 by 60 feet, by 8 feet deep, although the largest in area are not usually the deepest. They generally stand quite by themselves, being attached to no other buildings, and are often, even at principal stations, quite independent of the coal-supply fixtures. When placed upon brick walls, the space beneath them is usually enclosed and used for some rough purpose—in one or two cases that I have noticed, for the storage of coal or for lamps. It is rarely the case that any ornamental form is given to the water fixtures, and in no case have I yet seen any building inclosing the tank. As the frosts in most parts of this country are but seldom really severe, so far as disabling water arrangements is concerned, there is little pains taken to protect them in any way. The water-cranes, however, and their valves, are more easily disabled or obstructed by frost; but the principal means of protecting them, since they often stand at some distance from the tank, is merely a fire-grate, in which a coal fire is kept constantly burning when there is danger of freezing. This grate is sometimes a four-legged box, standing close by the side of the crane; sometimes it is crescent-shaped and is slung around the crane near the base, and sometimes it is slung up to the horizontal arm, near the joint with the vertical post.

A rigid arm for a water-crane seems to be little liked here, plainly because of the danger to which passing trains may be exposed from it, and a leather or canvass hose is used instead, which will hang down by the post and can cause no obstruction whatever.

Railroad Racing.

For the past month two railroad races have been in progress in this State. The first was between the Gilman, Clinton & Springfield and the Pekin, Lincoln & Decatur railroads. The goal in this race was the town of Mt. Pulaski, where a crossing is to be made. It appears that, in locating the lines, the engineers of the Gilman, Clinton & Springfield Railroad established the grade of that road, at the point of crossing, about two feet higher than the grade chosen by the Pekin, Lincoln & Decatur Railroad. The law is, that the track first laid down shall establish the grade, and any other lines which want to cross shall make their grade to correspond, and shall also be at the expense of cutting the rails and putting in the crossing frogs. In consequence of the difference spoken of above, each company has been anxious to get their iron laid beyond the point of crossing, so that they may save the expense of raising their grade for some distance to correspond to that established by the other company. All last week the track-layers on both these lines were straining every nerve to reach the crossing first. The people along the respective routes were infected with the excitement, and have been aiding the workmen by carrying iron and ties, and supplying water and provisions. The men worked all day on Sunday and up to a late hour last night. The contractors of the Gilman, Clinton & Springfield Railroad say that their track reached the objective point at 3 p. m. to-day, and won the race and sixty barrels of beer offered by the people of Mt. Pulaski to the successful workmen.

The other race was between the Bloomington & Ohio Railroad and the Decatur, Sullivan & Mattoon Railroad. The stakes were $30,000, which the town of Sullivan, Moultrie County, had subscribed as a donation to the railroad which first reached the town. The contractors on the Bloomington & Ohio Railroad are Shumway & Co., and on the Decatur, Sullivan & Mattoon Railroad, Tuttle, Keyes, Matheny & Lawrence, of this city. Each firm has been bringing to the work all the assistance which energy, capital and experience could furnish, and the contest has been very exciting. It was ended at 10 a. m. by the track of the Decatur, Sullivan & Mattoon Railroad being laid into the town limits a short time before its competitor struck the line.—*Springfield (Ill.) Register, Aug. 7.*

—A construction train of nine cars, with eighteen laborers on board, was precipitated into the Navasota River, Texas, July 29. Five of the men were instantly killed, two fatally wounded, and twelve more or less injured. One man was thrown twenty feet into the air, and, falling, was instantly killed. The accident was caused by the derrick of the wrecking-car striking the lateral braces and rods of the bridge. One span of the bridge was carried away, and the cars and engine are a mass of ruins.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—C. B. Simmons has been appointed Local Treasurer of the Louisville & Nashville Railroad, in place of Charles R. Griffith.

—Augustus Bradley, formerly of Cincinnati, has been appointed Auditor of the Indianapolis, Bloomington & Western Railway.

—M. C. Spencer has been made Treasurer *pro tem.* of the Pittsburgh, Cincinnati & St. Louis Railway Company, in place of Charles Hallowell, resigned. His office is in Pittsburgh.

—A. C. Bryant has been appointed Southeastern Passenger Agent of the Indianapolis & St. Louis Railroad, with headquarters at Atlanta, Ga.

—J. C. Sharpless, formerly Superintendent of the Wilmington & Reading Railroad, has accepted an appointment as Chief Engineer to superintend the construction of the Painesville & Youngstown Railroad, in Ohio.

—At a meeting of the Board of Directors of the St. Louis & Evansville Railroad Company, held at Benton, Ill., August 4, the following gentlemen were elected officers for the ensuing year: President, the Hon. Samuel E. Flannigan, of Benton; Vice-President, Captain Benjamin W. Herrelson, of Hamilton County; Secretary, William Dudley, of Du Quoin; Treasurer, Col. H. W. Hall, of Hamilton County.

—Isaac Butts has been elected President, and John Bell, Vice-President, of the Cobourg, Peterboro' & Marmora Railway and Mining Company. W. P. Chambliss is Managing Director.

—At a meeting of directors of the Topeka & Lawrence Railroad Company, last week, Major T. J. Anderson was elected a director in the place of Mortimer Cook, resigned; Judge Safford resigned his position as Treasurer, and Jacob Smith was elected to fill the vacancy, Judge Safford still retaining his position as director and the Secretary of the Board.

—Mr. W. S. Johnson has been appointed Freight and Passenger Agent of the new Peoria & Rock Island Railroad. His office will be at Rock Island.

—The stockholders of the Cleveland, Mt. Vernon & Delaware Railroad Company have chosen the following directors for the ensuing year: R. C. Hurd, Samuel Israel and Charles Cooper, of Mt. Vernon; Mardenboro White, of Gambier; Israel Harpster, of Millersburg; William M. Orr, of Orrville, and Thomas D. Messler, of Pittsburgh. The directors have chosen the following officers: President, R. C. Hurd; Secretary, Jos. S. Davis; Treasurer, John D. Thompson. All these are re-elected.

—Mr. Alfred B. Farnsworth, lately Passenger Agent at Cleveland of the Lake Shore & Michigan Southern Company, has been appointed Eastern Traveling Agent of the Toledo, Wabash & Western Railway, in place of Mr. W. H. Firth, resigned.

—The consolidation of the Marquette & Ontonagon and Bay de Noquet & Marquette railroad companies has been ratified. The title of the company is the "Marquette & Ontonagon Railroad Company." The following are the new directors: Joseph S. Fay, Francis C. Foster, Edmund W. Clapp, Joseph Iasigi, Joseph F. Greenough, Boston; T. P. Goddard, Providence, R. I.; Edwin Parsons, New York; Peter White and S. P. Ely, Marquette, all of the old company. The officers are Joseph S. Fay, President; S. P. Ely, Vice-President; Joseph Greenough, Secretary and Treasurer; D. H. Merritt, Superintendent.

—A railroad company has been organized in Peirce City, Mo., under the name of the Memphis, Carthage & Northwestern Railway. The amount required by law has been subscribed and five per cent. paid. The following officers have been elected: L. P. Cunningham, President; E. H. Brown, Secretary, and John B. Perkins, Treasurer. The Board of Directors consists of L. P. Cunningham, E. H. Brown, Josiah Boyd, Charles Marques, John B. Perkins, John S. Phelps and Henry C. Young.

—The "Baltimore, Pittsburgh & Chicago Railroad Company," which is to build the western outlet of the Baltimore & Ohio road, was organized in Pittsburgh last week and the following officers elected: President, W. O. Hughart; Secretary, John H. Page, Jr; Treasurer, W. H. Ijams; Directors, James Laughlin, Jr., W. D. Wood, and George F. McLane, of Pittsburgh, and W. Keyser, P. H. Garrett, and W. F. Burns, of Baltimore.

—Mr. Edward Wilder has been appointed Assistant Treasurer of the Atchison, Topeka & Santa Fe Railroad, *vice* O. P. Rice, resigned.

PERSONAL.

—Germain Sommeiller, who was associated with Grandis and Grattoni as one of the engineers of the Mont Cenis Tunnel, died July 12 at his native village, St. Jeoire-en-Faucigny, in Savoy. The work which he and his colleagues have so nearly completed will be a grander monument to his memory than the grandest of the Egyptian pyramids could be. M. Sommeiller was born in 1815.

—A Jurgensen watch and chain worth $350 were imposed upon Mr. P. S. O'Rourke, late Master of Transportation of the Pittsburgh, Fort Wayne & Chicago Railway, on his leaving that position to take the superintendency of the Michigan Lake Shore road from Allegan to Muskegon.

—Hon. J. K. Edgerton, of Fort Wayne, has declined the position of General Solicitor of the Grand Rapids & Indiana Railroad Company, of which he was lately the President.

OLD AND NEW ROADS.

Chicago & Northwestern.

The Baraboo (Wis.) *Republic* says: "Northwestern Engineer Purcell reports that a favorable line for a road from Lodi to Milwaukee has been found *via* Lowell, beyond Columbus, to Clyman Station, on the line of the North Division of the Northwestern, and thence in a very direct line to Milwaukee. It is reported that, in returning, the party will survey another line south of the one gone over, striking the Baraboo Branch of the Northwestern road at Dane, instead of at Lodi. It is, however, probable that the road will be built *via* Columbus.

Pennsylvania Railroad.

The Philadelphia *Post* says: "The Pennsylvania Railroad Company uses on the main line, between this city and Pittsburgh, 482 engines, 663 passenger cars, 6,632 freight cars, 731 coal cars, 96 baggage, mail and express cars. These are the property of the Pennsylvania Company. In addition to these there are run on the road 4,877 eight-wheeled cars not owned by the company. The road crosses 150 iron bridges, the total length of which is 13,960 feet; thirty-nine wooden bridges, with a total length of 8,977 feet, and seventeen stone bridges of twenty-four feet span and upward. It penetrates eight tunnels, the shortest one being 200 feet in length, and the longest 3,612 feet.

St. Paul & Pacific.

This road is now completed to Morris, 160 miles from St. Paul and 25 miles beyond Benson, which was the late terminus. From Morris to the Red River, 57 miles, the road-bed is nearly complete and the iron is going down, and through trains from St. Paul to the Red River of the North are expected in October. As steamboats can (and will) run on this stream to Lake Winnipeg, the Manitoba country of British America, hitherto so isolated, will have close connection with the rest of the world.

The directors of what is now known as the "First Division" of the St. Paul & Pacific Railroad Company have let a contract to Degraff, Crooks & Co., for building the line from Sauk Rapids to Brainard Point, where the Northern Pacific crosses the Mississippi. They agree to have it completed by December 1.

Peoria & Rock Island.

It is reported that surveys have been ordered for a line from Orion, on this road, nearly due west to Muscatine, 36 miles, in order, it is believed, to make a connection with the proposed road from Muscatine to Omaha.

Reading & Lancaster.

The Chief Engineer, George H. Arms, reports as follows the estimated cost of construction of this road on a 3-feet gauge, a distance of 45 miles. Seven miles of it will have a grade of 106 feet to the mile:

ROAD.

Graduation, masonry and bridging		$312,395 00
Ballast, 36,000 cubic yards,	at $1.10	39,600 00
117,500 cross-ties,	" .40	47,000 00
2,585 tons of 35-lb. rail,	" 75.00	193,875 00
20,000 fish-plate fastenings,	" .40	8,272 00
66,000 lbs spikes,	" .04	2,640 00
Laying 47 miles track (2-side),	"350.00	16,450 00
Depots, water-stations, switches, etc		20,000 00
Right of way, 220 acres		30,000 00
Engineering and contingencies		15,000 00

EQUIPMENT.

2 passenger engines, at	$6,500.00	$13,000 00
2 freight engines, "	7,500.00	15,000 00
1 construction engine, "	6,000 00	6,000 00
4 passenger cars, "	2,000.00	8,000 00
2 baggage cars, "	600.00	1,200 00
40 box freight cars, "	260.00	10,400 00
20 platform cars, "	205.00	4,100 00
25 coal cars, "	250.00	5,000 00
Total cost of road in operation		$647,932 00

The road is to extend from Reading southwestward through Adamstown, Farmersville and Lancaster, to the Susquehanna River at Safe Harbor.

Kingston & Pembroke.

This company proposes to construct a railroad from Kingston, Ontario (161 miles east of Toronto), a little west of north, to the Ottawa River at Pembroke, a distance of about 140 miles. All the required bonuses have now been obtained, and the resources of this company are now as follows: Kingston, $300,000; Frontenac, $150,000; Pembroke, $5[illegible],000; Renfrew County, $100,000—$500,000. Amount from government, $400,000. Total, $1,000,000. It is estimated that the road will cost $2,000,000, so that one-half of the capital has been raised; the other half will be raised by way of stock.

Connecticut Valley.

Mr. T. H. McKenzie, the Civil Engineer of this new railroad, writes to us as follows:

"The first train ran over the Connecticut Valley Railroad July 29. The gauge is 4 feet 8½ inches. The road is well patronized and will be a first-class, paying road. It is 44 miles in length, extending along the west bank of the Connecticut River from Hartford to Saybrook Point, at the mouth of the river. It was fifteen months under construction."

Buffalo Valley Branch.

Yutzy & Scott have taken the contract for the grading and masonry of this road from the town of Berlin, Somerset County, Pa., southward to the Pittsburgh & Connellsville Railroad, a little west of Meyer's Mills, a distance of about eight miles.

Paris & Decatur.

The grading is all let, and in great part completed, from Paris to Lovington, within about 20 miles of Decatur. The rest of the line is not yet located. Robert G. Hervey, of New York, has the contract for ironing and equipping the road, and McKinley & Co., of Champaign, the contract for the ties. It is intended to commence laying track about the 15th inst. The road will be about 70 miles long.

Media & Chester.

Books have just been opened to receive subscriptions to the stock of a narrow-gauge railroad about five miles long to be built from Media (13 miles southwest of Philadelphia, on the West Chester & Philadelphia Railroad) southeast to the Delaware River at Chester.

Grand Trunk.

This company announces that arrangements have been made by which the agents of the Pacific Mail steamers have been empowered to grant through bills of lading to Toronto, Montreal, Quebec, and other points on its line, and that merchants ordering teas can have their shipments made by the Union and Central Pacific, the Michigan Central, and the Grand Trunk Railway direct. The Pacific Mail steamers, with the names of their agents, are as follows: Hong Kong, T. A. Harris; Shanghae, Geo. T. Bowman; Yokohama, Geo. E. Low; San Francisco, Eldridge & Irwin. It is expected that arrangements will be completed by which there will be no transhipment between the Pacific coast and Sarnia.

St. Louis & Evansville.

A company with this name has been organized to construct a railroad from Du Quoin, the present terminus of the St. Louis, Belleville & Southern Illinois Railroad, eastward by way of Benton to McLeansboro, 38 miles. At the latter place will be the junction of the Evansville and the Shawneetown branches of the St. Louis & Southeastern Railway, which, however, is not likely to give any St. Louis business to the proposed road. At a meeting of the directors of the St. Louis & Evansville Company, on the 4th inst., the President was authorized to let the contract for the building of the road at an early day. Franklin County has subscribed to the capital stock of the road $200,000, and Hamilton County $37,000; private subscriptions in land have been made to the amount of nearly $50,000; making, in all, $287,000 already subscribed to build thirty eight miles of road.

Philadelphia, Wilmington & Baltimore.

This company is now engaged in constructing a new line between Philadelphia (at Gray's Ferry) and Chester, a distance of 9½ miles. The new line will lie about two miles back from the Delaware River. The authorities of Philadelphia before the commencement of the improvement raised the grade of the 27 streets crossing the road within the city limits, whereupon the company lowered the grade of its road so as to pass under the streets.

All the cuttings are being made wide enough to allow of four tracks, but the grading at present will be only for two. The grades at no point are over 25 feet, and there are no curves over one degree, except where the connection is made with the old road. One of the tracks will be laid with English solid steel rails, and the other of American steel rails, on oak ties, with screw spikes and ballasted with stone. There will be stations every half mile within the city limits, and every mile after leaving the city until Chester is reached. The station houses, as far as practicable, will be built over the tracks, and tickets will be collected from those going to or from Chester, before they enter the cars. It is estimated by the Chief Engineer, Mr. S. T. Fuller, that the entire cost of the improvement will be about $1,000,000.

Lexington & St. Louis.

A large amount of iron for this road, between Sedalia and Lexington, has arrived at Sedalia, and a large force is at work leveling the road-bed preparatory to laying the track.

Cape Girardeau & Iron Mountain.

An exchange paper says: "Seventy thousand dollars have been subscribed to the proposed Cape Girardeau & Iron Mountain three-foot-gauge road, and five per cent. paid in. Louis Houck, of Cape Girardeau, is President, and Major M. M. Kimmel, of the same city, Chief Engineer. It is to run through the ochre and porcelain beds west of Cape Girardeau, touch the black and gray marble quarries near Jackson, thence to the hematite iron banks in Bollinger County, thence to the celebrated mine La Motte, and thence to the great Iron Mountain. It will be down grade all the way from Iron Mountain to Cape Girardeau."

Keokuk, Iowa City & Minnesota.

The Keokuk *Constitution* announces that a contract has been made for sufficient iron to complete this road from Keokuk, nearly due north, to Mt. Pleasant, in Henry County, about 45 miles. It is ultimately to be extended to Cedar Rapids. The track-laying is to commence at Keokuk some time during this month.

Leavenworth to St. Louis, Narrow-Gauge.

A narrow-gauge, 3-feet road is proposed from Leavenworth, along the left bank of the Missouri River, through Augusta and St. Charles, to St. Louis. It is proposed to make this a part of a through narrow-gauge route, connecting with the projected Kansas Central, from Leavenworth to Denver, and at Denver with the Denver & Rio Grande, now building.

Oil Creek & Alleghany River.

The General Manager of this company, Mr. John Pitcairn, Jr., issued a circular on the 1st of August officially announcing the lease of the Union & Titusville Railroad.

Grinnell & Winona.

The Nashua (Iowa) *Post* says the line of this road is located between Grinnell and Cedar Falls—about 60 miles—and that it is probable the remainder, between Cedar Falls and Winona, will be determined this season. One line has been surveyed from Cedar Falls northward, passing near Fredericksburg, thence north near Lawler, in Chickasaw County. The last survey runs along the township line of Dresden, Richland, Dayton, New Hampton, Jacksonville and North Washington, in Chickasaw County, keeping about 6 miles west of the former line.

Geneva & Ithaca.

The contract for the construction of this railroad was signed on the 7th inst. The officers of the road are C. M. Titus, of Ithaca, President; R. M. Steele, of Romulus, Vice President; A. S. Chew, of Geneva, Treasurer; Colonel S. W. Payne, of Geneva, Secretary. This will give Ithaca connection with the New York Central by a line between Cayuga and Seneca lakes, which will cross at a sharp angle the Philadelphia & Sodus Bay road (narrow gauge). The local traffic between these lakes (a space from 7 to 18 miles wide) can hardly give abundant support to two roads.

Atlantic, Tennessee & Ohio.

This road, extending from Charlotte, N. C., nearly due north 46½ miles to Statesville, a station on the Western North Carolina Railroad 25 miles west of Salisbury, has recently been rebuilt by the Charlotte, Columbia & Augusta Company, which is to operate it in connection with its own line. This rebuilt road was first completed in 1862, but the next year the rails were removed by the Confederate Government for use on lines of military importance. The road runs through a hilly upland country where much grain and fruit, and some grass and stock are grown as well as cotton, being really near the border of the cotton-growing country.

Grand Rapids & Indiana.

It is proposed to construct a branch of this road from a point two miles north of its crossing of the Manistee River northwest about twenty miles to Traverse City, at the southern extremity of Grand Traverse Bay. In a letter to the Hon. Perry Hannah, dated July 22, 1871, General G. W. Cass, President of the Continental Improvement Company, estimates the cost of the proposed branch road at $250,000 for a track of the ordinary gauge, and says that the Grand Rapids & Indiana road is under contract to be completed and ready for use next year as far as the point of intersection named, and that, if the people of Grand Traverse County will build the road-bed and furnish the ties in the same time, trains will be running between Traverse City and Chicago by the close of navigation next season.

New Jersey West Line.

At a meeting of the Board of Directors, held at Newark, on the 26th ult., the following named gentlemen were appointed an Executive Committee, which will have entire supervision of the road: Asa Packer, Robert H. Sayre, Charles Hartshorne, J. C. Passinger and John H. Lyon, the first three being directors of the Lehigh Valley Railroad, and the two latter residents of New Jersey, and representing the old management of the West Line, and its earlier name, the Peapack Valley Railroad. The work is to be vigorously pressed to completion.

North Pennsylvania.

This company is about to put on its road three palace cars for the route between Philadelphia and Niagara Falls. Each car is sixty feet long by ten feet wide. There are in each five state rooms, or compartments, wash-rooms, and a large drawing-room, in the center of the car, containing eighteen large chairs, covered with velvet.

Chesapeake & Ohio.

The Richmond *Enquirer* fears that this road will be made a feeder of Baltimore and Northern cities rather than of Richmond, and says:

"If the Chesapeake & Ohio Railroad is ever to compete with the Baltimore & Ohio, the Pennsylvania Central, and the other great continental lines, for the traffic of the Mississippi Valley and the West, it is very certain that the company will be compelled to build a road from Clifton Forge to Richmond, *via* Lynchburg, or by some other new route. The grades on the present line of the Chesapeake & Ohio road are so heavy that it can never bring the traffic of the West to tide-water,

* * * * * * * * * * *

"It appears now that Richmond is threatened with being omitted altogether from the programme of this arrogant company, unless she will expend some two or three (probably five or six) hundred thousand dollars to bore a tunnel of 3,300 feet through Church Hill to Rockets. In other words, Richmond is to pay this amount to the Chesapeake & Ohio Company to induce them to comply with the terms of their charter.

* * * * * * * * * * *

"When we recall all that Richmond has contributed to this road—how she has been for years its main prop and stay—how she has been tricked about the promised air-line from Charlottesville to Richmond by these new corporators, who bound themselves in the contract by which they obtained possession of the existing work, to build that road (*which they now refuse to do*) —and when we remember that the State surrendered to Huntington & Co. some seven millions of stock in order to have the work completed—it never entering into the head of any human being that the capital of the State was to be thrown off of the line of the road—when we recollect these facts, it is difficult to set limits to our indignation at the duplicity which has been practiced by this company."

St. Paul & Chicago.

The northern section of this road was ironed last week to a point two miles north of the Zumbro River and within eight miles of the northern terminus of the completed southern section at Weaver. This completed southern section, from the junction with the Winona at St. Peter road at Minnesota City up the Mississippi fourteen miles, has been operated for some time by the LaCrosse, Trempealeau & Prescott Company, while the northern section is operated by the Milwaukee & St. Paul Company.

Manhattan & Northwestern.

Riley County, Kansas, in which Manhattan is situated, is to vote on the 7th of November next on a proposition to subscribe $150,000 in aid of this road, which it is proposed to build from Manhattan up the Blue River (northwest) about 20 miles, from which point two lines are to be built, northward and northwestward. Such a road would be a valuable feeder to the Kansas Pacific.

Galena & Muscoda.

Galena, Ill., is talking of building a new narrow-gauge railroad northward to the Prairie du Chien line of the Milwaukee & St. Paul Railway, at Muscoda, a distance of about 60 miles over a very rough and broken country.

Iowa Narrow-Gauge.

Messrs. Paul Brothers, of Akron, O., have been making surveys for this company. A preliminary survey has been made from Marshalltown to McGregor, and a line located from Waterloo southwestward to Grundy Center, about 30 miles. This, or a part of it, will form a section of the line from Marshalltown to McGregor. This section is likely to be built this season.

Lake Erie, Evansville & Southwestern.

The stock subscriptions already made to this company in Indiana amount to $800,000, and $400,000 more had been pledged. It is intended to commence work on the line at Evansville this month and to have it completed to Bellefontaine within 30 months.

Lee & Hudson.

The Boston *Advertiser* says the "surveys from West Stockbridge to Lee, which have occupied a party of eight for a month, are finished. Of the three routes over the mountain, the most feasible one, and the one which will probably be adopted, is that known as the Hagarpond route, which ascends the mountain from West Stockbridge, at a grade of 45 feet, and descends at 73, intersecting the Housatonic Railroad at Glendale, and running on an independent track, side by side, to Lee. The surveyor thinks $20,000 per mile will build the road, and in view of the possible short cut of the Boston & Albany from Westfield to Lee, the opening prospect seems quite favorable. A directors' meeting at Lee, Monday, transacted no business, but adjourned to August 15, when the plans and profiles will be presented by the engineer and acted upon."

Quincy, Missouri & Pacific.

The city of Quincy has issued bonds for $250,000, one-half of the subscription authorized. This issue was ordered upon a statement of the President of the company to the effect that $1,118,900 had been subscribed to the capital stock of the company in the States of Missouri and Nebraska, being $318,900 more than the sum required to enable the company to obtain the $250,000 in bonds of the city of Quincy. The statement further showed that thirty miles of the road, extending from West Quincy westward, have been graded and bridged, with the exception of the Fabius Bridge, which has just been contracted for and is now about ready for delivery; that the balance of the grading and bridging to Edina is now under contract, and a force of from five to six hundred men are now pushing the work vigorously, which work will be completed by the 15th of November next; that the iron necessary for the completion of the road and side-tracks to Edina (4,500 tons) has been purchased and is now on its way to West Quincy; that two locomotives and the other necessary rolling stock has been purchased, and the road will be completed and put in operation to Edina by the 15th of December next; that three miles of the west end of the road, extending from a point opposite Brownsville, Nebraska, to the town of Phelps, Missouri, have been graded, bridged and prepared for the iron.

Alabama & Chattanooga.

The latest phase of the troubles in which this company is involved is indicated by the dispatches below between the President of the company and the Governor of Alabama:

"NEW YORK, July 27.

"Our property has been seized in the night by armed men and run off into another State. Will you protect the road and property of this company from being seized, interfered with or destroyed by persons in the State of Alabama in such manner that it can be run with safety by this company? Answer.

"D. N. STANTON,
"President A. & C. Railroad."

To this despatch the Governor made the following reply:

"MONTGOMERY, July 27.

"*D. N. Stanton:* The A. & C. R. R. and property will be protected, and in order the better to accomplish this object and to protect the interests of the State and other parties concerned, I have proceeded in the name of the State and under the laws authorizing me to take possession of the road and appurtenances.

"R. B. LINDSAY."

Colonel Gindrat, Private Secretary, and Gen. James H. Clanton, were commissioned to take charge of the road and have taken possession from Meridan, Miss., to Attala, near the Georgia line. That part of the road between Attala and Chattanooga is not yet controlled by the commissioners.

Missouri & Mississippi.

The President of the Des Moines Valley Railroad Company, Mr. D. W. Kilbourne, is authority that the Missouri, Iowa & Nebraska Railroad Company have contracted to complete the road from Keokuk southwest to Glasgow, on the Missouri River. There is talk of continuing the road from Glasgow to Sedalia and making it one of the outlets of the Missouri, Kansas & Texas road. The grading of 53 miles of the line has been done.

La Clede & Fort Scott.

The Bolivar *Free Press* announces that work on this road in Polk County has been resumed; the county bonds issued lately to Burgess & Shea, contractors, having enabled them to settle with the sub-contractors and proceed with the construction.

Denver & Rio Grande.

The first rails on this narrow-gauge road were laid on the 1st of August. A considerable amount of rolling stock, including two freight and two passenger locomotives, is at hand ready to be placed upon the track.

Northern Pacific.

Mr. John Ross, of the Northwestern Construction Company, who has direct charge of the track-laying, informs the Minneapolis *Tribune* that by the middle of October the track-laying will reach the Red River. The grading is so nearly completed that it can be kept in advance of the track-layers.

Burlington, Cedar Rapids & Minnesota.

We learn from the Charles City *Intelligencer* of the location of the road through Floyd and Cerro Gordo counties. It will cross Shell Rock River at Rockford, about 14 miles west of Charles City, continuing up the west bank of the river to Nora Springs—about 10 miles east of Mason City—and to Plymouth, a station on the Austin Branch of the Milwaukee & St. Paul, 8 miles northwest of Mason City. It was until lately supposed that the road would pass through Mason City.

St. Louis & Cedar Rapids.

This road is now in course of construction between Ottumwa and Cedar Rapids, Iowa—an air line distance of about 80 miles. Between Ottumwa and Sigourney the contractors, Messrs. Wolf, Carpenter & Angle, have the road-bed nearly ready for the iron, which is purchased and on the way.

The Ottumwa *Courier*, in speaking of the connections of this new road, calls it part of an *air line* between St. Louis and Dubuque. The use of this expression, "air line," as applied to new roads and routes has become almost universally ridiculous, and this is but an instance of it. An air line between St. Louis and Dubuque is about 265 miles long. Should this new road be operated by the North Missouri Company—as it probably will be—the route, by way of the Dubuque Southwestern and Illinois Central from Cedar Rapids northward will be not less than 435 miles. And yet this route which bends more than one hundred miles from the direct line, and is nearly two thirds as long again, is pronounced an "air line." Moreover, it will be at least 54 miles longer than the present route of the Illinois Central, *via* Vandalia.

Duxbury & Cohasset.

This Massachusetts road between Duxbury and Cohasset, 17¼ miles, is to be ready for operation by the 17th of August. It is now in operation from Cohasset to Marshfield. The stations on the line of the road now finished are North Scituate, Egypt, Scituate, South Scituate, East Marshfield, Littleton, Marshfield Center, and Marshfield. Three more stations are yet to be reached, viz: Webster Place (near Cut River), Duxbury and South Duxbury. The road is operated by the Old Colony & Newport Road.

Brunswick & Albany.

It is reported that the track-layers on this road will have their work completed to Albany, Ga., 172 miles from Brunswick, by the 20th of August. One hundred miles are now in operation, from Brunswick to the Withlacoochie.

TRAFFIC AND EARNINGS.

—Hon. V. Hickox, Canal Commissioner, furnishes the following figures as to the tolls collected on the Illinois & Michigan Canal during the past three months: May, $24,786.28; June, open only twenty-four days, $21,199.65; July, open only fourteen days, $14,671.33. Total, $60,657.26. The canal was closed the last six days in June and the first seventeen days in July, between Joliet and Chicago, to enable the locks to be taken out at each end of the Summit level.

—The traffic receipts of the Grand Trunk of Canada for the week ending July 15 amounted to £31,700, against £28,900 in the corresponding week of last year, showing an increase of £2,800, or nearly 10 per cent.

—The traffic receipts of the Great Western of Canada for the week ending June 14 amounted to £18,498, against £13,846 in the corresponding week of last year, showing an increase of £1,652, or 33⅓ per cent.

Prospective Traffic of the New York Viaduct Railroad.

The following report has been submitted to and unanimously adopted by the Executive Committee of the New York Viaduct Railroad Company:

To the Executive Committee of the New York (Viaduct) Railway Company:

Having now progressed sufficiently with the investigation of the proposed route, and consequently the proposed cost of this road, it seems appropriate at this time to lay before you the following views entertained on consultation with our engineers respecting the ultimate results which will attend on positively assuring "*rapid transit*" to the citizens of New York. The views presented are purposely made moderate, and it is believed they cannot be disputed. However, they are submitted to you as the result of our convictions, after carefully investigating the entire subject.

COST OF THE ROAD.

The cost of real estate to be acquired, the cost of construction and running expenses, contrasted with the receipts for rents and passenger and freight traffic, are the elements which must determine the probable profits on capital invested. For the purpose of arriving at a fair conclusion, it is proposed to review these items separately, and make such reasonable allowances as may be suggested upon either of them.

The estimate of the cost of the Eastern Viaduct, from Chambers street to the Harlem River at One-hundred-and-thirtieth street, is considered equally applicable to that of the Western Viaduct to Manhattanville.

The cost of necessary real estate for viaducts and depots is estimated at $1,000,000 per mile, or say for 80 lots, with buildings, at an average cost of $12,500 each. The con-

struction of the viaduct, including rails and permanent road-bed and running stock, will cost $2,000,000 per mile. The distance from the City Hall to the Harlem River at One-hundred-and-thirtieth street, or to Manhattanville, being 7¼ miles, would make the cost of each branch of the road $32,500,000, and with an allowance of $2,500,000 for unforeseen contingencies, would make the entire cost of each branch of the road $25,000,000.

CAPACITY OF THE ROAD.

It is proposed that each branch road shall have four tracks—two for fast travel, making stoppages at about two miles apart, and two for way travel, making stops at about each half-mile. Twenty trains per hour can be safely run upon each track, each train to average 300 passengers, which would make the number of passengers that could be carried in 14 hours of the day, upon four tracks, 336,000. But it must be remembered that during three hours of each morning and evening, the travel on the road will be greater than during the remainder of the day, and that as soon as the road is found not competent to accommodate the travel offered during the morning and evening hours, other roads must be built to accommodate the surplus. Hence it is that the projected roads will not at any time have the opportunity to carry as many passengers as their full capacity will admit during ten hours of daily work.

Trains of about two-thirds of full capacity will probably be required in the middle of the day, and therefore the ultimate transit on each road ought to be estimated at not more than 248,000 passenger fares per day, and this is calculated to include the night travel beyond 14 hours assumed as a day's work. In addition to this, each road will be capable of carrying a very large amount of freight during the night, and of doing a large express and light-freight business at all hours of the day.

THE BUSINESS TO BE DONE.

At present we have official information that there are being carried on the horse railroads of this city over 130,000,000 passengers per annum, 70,000,000 of whom are carried upon the lines east of Broadway and Fifth avenue, running north and south. In addition to this, very many millions are carried in omnibuses and upon the Harlem, New Haven, and Hudson River railroads, by steam power, and by the five Harlem steamboats which run continually throughout the day. The transportation business of the horse railroads and Harlem steamboats is all the growth of a very few years, and is increasing rapidly, year by year, the increase during the past year being over 20 per cent. The largest increase is on the lines which run with the greatest speed, showing conclusively the desire of the people for "*rapid transit.*"

The continual increase of population and the constant absorption of residences in the lower portions of the city for business purposes are compelling the inhabitants to find homes in the upper portions of the island, or across the ferries, and now a considerable portion of the business community in the lower portions of the city have their homes across the ferries, because they can reach them in less time than they can from the upper portions of the island.

The most densely populated districts in the upper part of the city owe their growth entirely to the present facilities of transportation, and although these facilities are greater than they have been at any previous time, they are still inadequate to the wants of the people. To go from Sixty-fifth street to the City Hall by the Madison and Fourth avenue horse-railroad line takes about one hour, and by the Third avenue line about forty-five minutes; and to go from Harlem to the City Hall by the Third avenue horse-railroad line takes an hour and twenty minutes, and by the steamboats 45 minutes. The New York Railway Company will convey passengers between the City Hall and Harlem in 20 minutes, and to intermediate points in a proportionately short time.

At Harlem we may expect to receive a large amount of through travel and traffic from the interior of the country. Several new lines of railroad are now being built, which will terminate on the banks of the Harlem River, and will be completed by the time that the New York Railway Company can reach that point. One or more of these roads will connect with the whole interior system of railroads in New England, Northern New York and the West. We may therefore count, not merely on the local travel of the island, but also on a large business from the interior of the country, consisting not only of passengers but also of freight.

The receipts for freight on the four great trunk lines of railroads are more than three times that for passengers, and the receipts on the New York & Harlem Railroad are greater for freight than they are for passengers, including their passenger receipts from their horse railroad. It is, therefore, fair to assume that the receipts for freight by the New York Railway Company will be very large. The receipts for freights on the New York & New Haven Railroad are about one-third of those for passengers, being less, in comparison with their receipts for passengers, than on any first-class railroad in the country.

But to put our estimate at an amount so reasonable as to be beyond question, let us assume that 300,000 persons now ride daily up and down into and through the City of New York, on railroads, steamboats, street horse-cars, and stages; in other words, that 600,000 fares are now daily paid for riding in public conveyances into and through the city—is it not fair to assume that 250,000 of that number of fares, or 125,000 passengers, would at once patronize the Viaduct railways, if both branches were built, and this without necessarily reducing the profits of street-cars or stages. Fewer cars for a while might be run, but those would be entirely filled with passengers going but short distances.

Hence, if New York City was not to increase in population from the time the Viaduct roads are finished, it is, therefore, but reasonable to assert that such roads, if *both branches were now in operation*, would receive 220,000 fares daily, and the railroads, steamboats, horse-cars, and stages would still retain 350,000 fares per day, and such 350,000 shares and their natural increase would yield them as large, if not a larger, profit than that derived from 600,000 now employing that mode of conveyance. The reason of this may be found in in the fact that very many persons who will use the Viaduct road will also use the horse-cars and stages to carry them short distances, to the Viaduct Railway depot and elsewhere, and also in the fact that short travel increases with increased facilities.

There can be no doubt, however, that simultaneously with the construction of either branch of the Viaduct, many houses will be erected in the upper part of the city, and by the time the *easterly branch of the Viaduct is completed to One-hundred-and-twenty-fifth street*, 5,000 additional houses, tenements and factories will furnish 10,000 persons, or 20,000 fares, who will use the road, up and down, once a day, and will make the total daily fares on this branch at least 140,000. From many sources the number will increase during the first ten years of the operation of either branch of the road, until is reached their full capacity.

Each Viaduct will occupy over 600 lots, between Chambers street and One-hundred-and-twenty-fifty street, 500 of which may be let for stores or manufacturing purposes, and each of these will comprise a store of 25 feet by over 90 feet, and from 12 to 16 feet high in the clear; also a basement of the same size. It is safe to assume that each of such stores will rent for $1,000 per year; but if an allowance of 20 per cent. is made for contingencies, an annual rent of $400,000 will be derived from them, provided it shall not be found that their use may be more beneficial to the company than any income that might be derived from their rental.

Assuming, then, that the travel on the *Eastern* Branch of the New York Railway will be 140,000 per day, or 50,000,000 passenger fares per annum (and this is a very moderate estimate, as one line of horse-cars is now carrying annually over 30,000,000 passengers), the receipts will be as follows:

Passengers—say 50,000,000 per annum, or 140,000 fares per day, at an average of 13 cents	$6,500,000
Freight, mail, and express matter, 40 per cent. of above	2,600,000
Rents, as above	400,000
Making gross annual income	$9,500,000
The expenses for maintenance, transportation, repairs, etc., of first-class road doing a heavy passenger business are usually about 55 per cent. of gross receipts. This road will be much less because it must necessarily be built more compactly, and will, therefore, be less needing the usual and more expensive repairs incidental to a rail-track laid on the ground, subject to frosts, thaws, storm, and earth-washings. But allowing for maintenance, etc., 50 per cent.	4,250,000
We have a net annual income from each line of viaduct of	$5,250,000
Equal to interest at 7 per cent. on $17,000,000 of bonds, or	$1,190,000
And say 50 per cent. on $8,000,000 of stock	4,060,000
Total	$5,250,000
Or equal to interest at 7 per cent. on $12,500,000 raised on bonds	$750,000
And say 33 per cent. dividend on $12,500,000 capital stock.	4,500,000
Total	$5,250,000

NO VIADUCT BELOW CITY HALL.

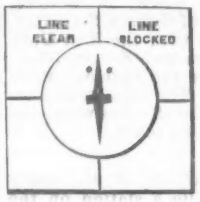
The attention of the engineers has also been given to the subject of connecting the lower part of the city with the trunk line of viaduct near the City Hall, by one or more branch lines, as authorized by section 12 of the charter of the company, and also to the subject of encircling the business part of the city with an elevated or viaduct railway, along the projected line of new bulk heads, as soon as they may be completed, and connecting them with the track or main line of viaduct at the principal stations, as by such means all persons arriving in the city by ferries or steamboats could immediately, and without crossing South street, be transferred to the main lines.

The engineers, after full consideration of the subject, did not consider it expedient or proper to extend the main trunk line below the City Hall, because the number of passengers to be transported below that point must certainly be so much less than above it, that it would not be remunerative to run all trains to the lower end of the city; but they have considered the propriety of constructing a branch road from the depot near the City Hall in direct line to the Battery, near the South Ferry, and have estimated that a two-track road, occupying not more than 25 feet width, with cars propelled by steam-power at the rate of about 20 miles per hour, and making stoppages in each direction in the vicinity of Pine street or Wall street, could be built simultaneously with the trunk line, and be sufficient for the accommodation of the middle part of the city below the Park and new Post Office, because no part of such distance would then be more than one-fifth of a mile from a depot. The expense of constructing such a line would be great, as it would unavoidably have to pass through very valuable property, and the engineers are doubtful if it would be remunerative in so high a degree as either the Easterly or Westerly Viaduct above the City Hall. The powers of the company, under its charter, seem to be ample for the construction and operation of such a branch viaduct in connection with the trunk lines, and for the entire separation of the cost of it and its earnings and profits; and if citizens and property-owners in the district to be benefited by such a branch are desirous and willing to subscribe the necessary capital for its construction, there does not appear to be any valid reason against its being built at the same time with the Eastern Branch of the road as contemplated.

HENRY HILTON, President.

The English Block System.

The best kind of block system now in use is worked as follows: Signal-boxes are placed along the line at distances of from one to two miles, according to the amount of traffic. Each box is fitted with four telegraph instruments, one for the up and down line in each direction, and two electric bells, one for each direction. Outside the box is a signal-post with two arms; and two distant signals are placed, one in each direction, half a mile from the box; also two sidings, long enough to shunt a train into, one on each side of the main line; and the points must be put in so that trains must back into the siding, to avoid the danger of "facing points." The telegraph dial instruments are provided with a small peg, to peg the needle over to either side. The figure below represents a dial instrument, one of which is used for each line.



DIAL SIGNALS.

Signal correctly repeated, one beat of needle to right.
Passenger train approaching, three beats do.
Express goods or cattle train approaching, four do.
Through goods or mineral train approaching, five do.
Stopping goods, mineral or ballast train, or light engine approaching, six do.
Signal incorrectly repeated, one beat of needle to left.
Fast passenger train on line, two beats do.
Slow passenger train on line, three do.
Express goods or cattle train on line, four do.
Through goods or mineral train on line, five do.
Stopping goods, mineral or ballast train, or light engine on line, six do.
Line clear of train or engine, two beats of needle to right.

BELL SIGNALS.

To call attention, one beat of the bell.
Be ready for passenger train, two beats do.
Be ready for goods, cattle, mineral or ballast train, or light engine, three do.
Train on line, four do.
Shunt train for passenger train to pass, five do.
Signal given in error, six do.
Stop and examine train, seven do.
Shunt train for goods or mineral train to pass, eight do.

To avoid mistakes, all signals must be acknowledged by repeating them, and no signal must, under any circumstances, be considered as understood until it has been correctly repeated back to the station from which it was received, and the acknowledgment given that such repetition is correct.

For the purpose of illustrating the course to be adopted, *A B* and *C* are supposed to represent three signal-posts, and the process of signaling a train is as follows: On the approach of a train to station *A*, the signalman will call the attention of station *B*, and then give the "be ready" signal by two or three beats on the bell, as the case may be, and station *B*, after having ascertained that the line is clear for the train to run upon, must repeat the signal. Station *A* must then indicate to station *B* the kind of train that is approaching by giving the proper "train approaching" dial signal, and when station *B* has acknowledged and received the necessary intimation from station *A* that his acknowledgment is correct, he must peg the needle to "line clear." As soon as the train has passed station *A*, he must give the bell signal "train on line," upon hearing which, station *B* must acknowledge the signal and unpeg the needle. Station *A* must then give to station *B* the proper "train on line" dial signal, and when station *B* has acknowledged and received the necessary intimation from station *A* that his acknowledgment is correct, he must peg the needle over to "line blocked," and call the attention of, and give the "be ready" signal to, station *C*. As soon as the train has passed station *B*, it must be signaled in a similar manner to *C*, who will, in like manner, forward the "be ready" signal to station *D*, and so on through the block. When the train has *passed* station *B* the signalman at *B* must call the attention of station *A*, and give the proper dial signal, indicating that the line is clear of the train, which must be duly acknowledged by station *A*. If the line is not clear at the time the "be ready" signal is received, the signalman on duty must not repeat the signal, or acknowledge it in any way, until the line has been made clear, and after having pegged the needle to "line clear," the line must not, under any circumstances, be allowed to be fouled until the train for which the "be ready" signal has been given has passed the station.

The signal "stop and examine train," is only to be used in the event of a signalman observing anything unusual during the passage of a train past his post, such a vehicle on fire, broken axle, etc., etc. Any signalman receiving such signal must immediately exhibit the necessary signals to stop the train.

Should a second train arrive at a signal-box before the preceeding one is "signaled as clear," it must be stopped till such signal is received. The use of the sidings is to shunt coal and goods trains into, for passenger trains to pass. This kind of block system is used on parts of some of the principal railways, and on those parts the accidents from collisions have been reduced to one or two per year where there was an average of fifteen to twenty without the block system; and those that do occur must either from the drivers not being able to stop their trains at the signals, or the mistake of the signalman. I think your readers will appreciate the value of the system.—*Correspondence English Mechanic.*

—The shipbuilders on the Clyde, during the year 1870, launched 192 vessels, measuring 180,401 tons in the aggregate. On January 1, 1871, there were in process of construction 140 ships, measuring 182,876 tons in the aggregate. These vessels were classed as follows: One hundred and eighteen iron steamers, ranging from thirty to three thousand tons, and actually measuring 169,379 tons in the aggregate; two iron sailing ships, measuring 2,486 tons; one composite steamer of 565 tons; two composite sailing ships, measuring 3,000 tons; one wooden steamer of ten tons; two wooden sailing yachts, measuring fifty-eight tons; thirteen iron dredges and hopper barges measuring 5,270 tons, and one iron turret monitor of 2,107 tons. In the beginning of July contracts had been entered into for the construction of forty-five ships, which, owing to the increased size, will bring the product for 1871 far above that of 1870, even if no other ships are built during the remaining six months of the year.

PUBLISHER'S ANNOUNCEMENTS.

The Merriman Bolt Cutter.

This machine, the invention of a Chicago man, has now been in use for five years, in which period it has become widely known and highly approved for extreme simplicity of construction, and rapid and effective operation. Its manufacturers claim that more of their bolt cutters are sold yearly than of any five other makers. It is used in every State in the Union, is extensively manufactured in England, and has been shipped to Australia, India and other distant regions. Many large railroad, bolt and machine shops are provided with them, and the success of the machine in the few years since its introduction certainly indicates solid merit in the invention as well as energy and enterprise in its manufacturers.

The Merriman bolt cutter is sold in Chicago at manufacturers' prices by C. L. Rice & Co. and by W. A. James & Co.

Railroad Gazette.

"No fact of importance escapes its vigilance, and it seems to have its eyes directed as much to the eastward and the Southern Atlantic States as to what is going on in railroading in the West. As a record of railroad current history, it is all that the railroad official or capitalist desirous to keep himself posted up, with limited time for general newspaper reading, could desire. And the railroad engineer and machinist will always find instruction in its pages."—*United States Railroad and Mining Register.*

"The number before us would be worthy of any metropolitan publishing house in the world."—*Brooklyn (N. Y.) Argus.*

"The best of its class."—*Indianapolis Evening News.*